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INDUSTRIAL-ARTS MAGAZINE

Vol. VI MARCH, 1917 No. 3

THE LIMITATIONS AND POSSIBILITIES OF INDUSTRIAL TRAINING FOR WOMEN

Edna Bryner, Author of Reports on Garment Trades and Dressmaking and Millinery, Cleveland Education Survey

NOWHERE, we believe, has anyone come out directly with a statement of the fact that the problem of training girls for industrial life is bounded by what can be done with the needle and needle machinery. A close study of school surveys, factory and shop investigations, special inquiries into women's work, analyses of occupational statistics, and vocational conferences gives unmistakable indication of this important tho little known fact. The big task which vocational education has before it, in the next few years, is to work out a comprehensive plan for training young women who are to earn their living in that homogeneous group of industrial occupations, the sewing trades.

At the present time vocational education is practically synonymous with industrial training. At mention of the phrase the mind invariably conjures up a picture of boys working with wood and metal in school shops. In the public school the courses to which the term vocational is applied are mostly shopwork, cabinetmaking, forging, and machine-shop practice. Vocational training for girls who are to be wage earners is most often construed to mean instruction in one of the trades, dressmaking or millinery, or possibly some sort of factory work. Certainly industrial training is in the forefront of the minds of persons interested in vocational education.

The industrial occupations have a right to a considerable amount of attention for they employ between a fifth and a quarter of all the working women in the country. Of the eight millions of women wage earners in the United States upwards of two millions are engaged in industrial work. More accurately, if the eight millions were represented by 80 women, each standing for a hundred thousand of her sex, then eighteen of the 80 would be employed in industrial occupations.

The enumeration of occupations in this tremendous field of labor, designated in the United States census as the manufacturing and mechanical field, extends over fifty pages in the latest edition of the census. Besides the group made up of such occupations as dressmaking and millinery and known as hand trades, there are thirteen groups of manufacturing industries classified, on the basis of materials used, as follows:

Chemical
Clay, glass, and stone
Clothing
Food
Iron and steel
Leather
Liquors and beverages
Lumber and furniture
Metal
Paper and pulp
Printing and bookbinding
Textile
Miscellaneous

Several industries comprise each group so that altogether there are about 75 separate industries of considerable size. Eleven industries, for example, make up the textile group: carpet, cotton, hemp and jute, knitting, lace and embroidery, linen, rope and cordage, sail, awning, and tent, silk, textile dyeing, finishing, and printing, and woolen and worsted.

All of these industries have in common various occupations necessary for the carrying on of the business—occupations which have to do with management, with clerical work, and with the physical upkeep of the plant. In addition, each industry has from six to more than sixty occupations directly concerned with the manufacture of the product peculiar to the industry. There are, for example, 49 occupations such as creelers, nappers, and slubbers, peculiar to the cotton industry.

A study of the women workers in this great field of labor with its 75 industries made up of numerous occupations shows that they fall into two main groups, those engaged in the sewing trades and semi-skilled operatives in factories. The two groups are nearly of the same size. Of every one hundred women in the industrial field 47 earn their living by some kind of sewing, and 45 by working as semi-skilled operatives.

Sewing women form a fundamentally homogeneous group. They are bound together by their common knowledge of the tools of their craft, the needle and needle machinery, and by the mass of technical and trade information coincident to the making of clothing. As dressmakers, seamstresses, milliners, and factory sewers they all handle textile materials. They have a chance to put to good account whatever grade of ability they possess somewhere in the sewing field. In each trade they have

opportunity to apply different grades of skill. In machine operating, for example, the least skillful workers may tend an automatic machine for sewing on buttons, while highly skilled workers may make costly cloaks. In every sewing trade there is an educational content which demands of its workers an appreciable amount of training.

Semi-skilled operatives form a superficially homogeneous group. They have in common neither tools, nor materials, nor products. They are classed together merely because of their common adaptability to various kinds of work requiring the application of a small amount of skill and a moderate amount of intelligence. Either they require no tools or else they use automatic or semi-automatic machinery. They work with all sorts of materials from iron and steel to paper; and assist in turning out an infinite variety of products. The operations they perform have little educational content and require but a short period of time to learn.

The distribution of semi-skilled operatives among the different industries shows the nature of the materials with which they work. Nearly half of them, in fact 43 out of every one hundred, are in textile factories, working with cotton, silk, wool, canvas, lace and other textile materials. Nine out of every one hundred are in cigar and tobacco factories; seven are in shoe factories; six in clothing establishments; five in metal works; five in food manufacture; four in printing and publishing houses; two in lumber and furniture mills; one in clay, glass, and stone works; and eighteen in other industries.

Most of the semi-skilled operatives in textile factories are engaged in a small number of operations. More than three-fifths of them are weavers, winders, reelers, and spoolers, spinners, and drawers, rovers, and twisters. Of weavers alone there are nearly a hundred thousand. In cigar and tobacco factories the largest proportion of semi-skilled workers are strippers and stemmers, rollers and packers of tobacco. In shoe factories they are mostly operators of the various automatic machines used in the manufacturing process. In all sorts of industries they label, sort, wrap, and pack the different kinds of products.

Knowledge of half a dozen tasks is sufficient for an understanding of the sort of work performed by semi-skilled operatives. Take the work of bindery operatives, which is truly representative. Many persons have been unduly exercised over the hard lot of these workers and have suggested that vocational training would benefit them greatly.

The principal tasks performed by semi-skilled workers in the bindery are folding and gathering. In folding by hand the worker doubles the printed paper in such a manner that the printing on one page is exactly even with the printing on the other and creases the fold with a small bone stick called a folder. In folding by machine the operator feeds the sheets to the machine one by one, slipping the sheets along to the teeth of the machine with such well-timed motion that there is a continuous stream of paper flowing into it. The machine automatically folds the sheets into the desired form and slips them one by one into a neat pile on the receiver.

The gatherer gets together the folded sections in the right order for the book. In making up the book she moves rapidly along a row of the sections, piled on a table in regular order, gathering one section after another until the book is complete.

Semi-skilled workers in binderies also number the pages of blank books, perforate pages of trading stamps and checks, punch holes in loose leaf sheets, round off the corners of pages, cut pages for indexing pamphlets, and feed ruling machines. They do nearly all of this work by machine, their main tasks being to feed sheets or sections to the machine in the right order and position and to operate levers by hand or foot.

After a thoro study of all these processes in the bindery one is bound to conclude that there is so little educational content in all of the tasks put together as to make classes of instruction for bindery operatives an anomaly.

It seems incredible to most persons that the various kinds of work in which semi-skilled operatives are engaged possess no educational content. One is inclined to hope that if he will search long enough he will find hidden away sufficient material of educational import to justify the organization of classes of instruction. The tendency is to manufacture educational content where little or none is found; and to suggest as vocational training those subjects which are essentials in a general education curriculum—development of hand skill, personal hygiene, and organized recreation.

The search for educational content in work which is destitute of it goes on partly in response to a demand that vocational education shall solve one hundred per cent of the problems of both education and labor. Many persons would have us believe, "Train a man for his job and labor is saved." The supposition is that every job has enough to it to make organized training possible. A thirty per cent return where one hundred per cent is expected is highly unsatisfactory. In the effort to make a greater return than circumstances warrant, classes of vocational nature are suggested for such workers as bindery operatives, candy dippers, and strippers and stemmers of tobacco.

It appears impossible, moreover, that the range of work offering practice of skill to women in the industrial world should be so narrow as to include only the sewing trades. For men there are many trades employing large numbers, carpentry, blacksmithing, painting, plumbing, building, masonry, engineering, and machinists' work. Dressmaking, mil-

linery, plain sewing, and factory sewing sound meagre beside this list. And so one searches further in the industrial field and inevitably runs into the realm of the semi-skilled worker.

There is perhaps another reason why it has not been fully recognized that training for trade sewing is the one big contribution vocational education can give to girls who are destined to be wage earners in the industrial field. Training for trade sewing encroaches upon the domain of household arts. There is always a shrinking from anything which tends to disturb what is being done for home work. A radical readjustment of home sewing courses would undoubtedly be necessary in planning adequate training for entrance to the sewing trades, considered as a homogeneous group of occupations. And it is only by considering them as a homogeneous group just as the clerical occupations—stenography, typewriting, bookkeeping, and business practice—have been looked upon and dealt with as homogeneous, that a training scheme worth while can be evolved.

More than 800,000 women in the country are wage earning sewing women. This means that one out of every ten of the eight millions of working women in the United States is earning her living as a dressmaker, seamstress, milliner, or factory sewer. A greater number are engaged in sewing than are employed in public and professional work, or in clerical occupations, or in selling. Vocational training has long been established for all kinds of professional workers. It has been fully recognized as necessary for clerical workers; and schools everywhere, both public and private, offer the branches of business practice. The movement for training saleswomen is well on its way. Training for girls who are to enter the sewing trades is sporadic. These trades are not even recognized as a homogeneous group. It is time now to take account of the wage earning needlewoman and to do for her what has been done for the professional woman and for the clerical worker.

Qualifications of Manual Training Teachers

Will J. Craig, Saginaw, Mich.

IN a discussion of this kind, it is quite proper to inquire where many of the manual training teachers are prepared. We have great universities, normal schools and special training schools, all turning out qualified teachers. The process of becoming a qualified teacher is quite simple, altho somewhat tedious. The prospective teacher agrees to study certain subjects a specified number of hours and in return gets something that is termed a credit. When he gets the required number of credits he can swap them for a degree or a diploma or a life certificate. You will notice a great change in him now. He begins to look down on others less fortunate than himself and also to look for a position. He is qualified to act as superintendent, supervisor, or principal. He can teach any subject in the high school, but if he fails to land one of these he still has manual training as a kind of last resort. In the course of time, the daily paper in a certain city publishes as a news item that Mr. A has *accepted* a position as instructor of woodwork in the seventh and eighth grades and will take up the work with the beginning of the school year. Before we look in on Mr. A at his work, I wish to tell you what he may find waiting for him. This is a true statement of the condition of a room the writer once found waiting for him at the beginning of the school year. The room contained 24 benches. Each bench was equipped with one iron jack plane, try-square, rule, knife, compass, gouge, gauge, three chisels, back-saw, 22″ cross-cut saw, and rip-saw. I looked over the planes first, only to find many of them cracked or broken thru the throat, others minus the handle or knob, or the frog broken and side adjusting lever gone. After scrapping the broken ones and using what I could of them to fix up the others I found I had thirteen good ones and some repairs for the future. Back-saws next—seven new handles and a few extra screws fixed them up. It required over three dozen screws to fill the empty holes in the handles of the cross-cut and rip-saws. Not a single compass could boast of a set-screw, and only one gauge was all there. The plane irons, chisels, and gouges needed grinding and the saws needed filing. There was plenty to do.

Now, Mr. A may not find things just as I have described them, but the chances are that he will find a golden opportunity to do some work before that room is in order for business. What has been his training to prepare him for an emergency like this?

At this point I want to suggest an idea for a summer-school course for young teachers of manual training in the grades, time to be divided as follows: First two weeks, drawing in the morning, and tool repair in the afternoon. The remainder of the time should be given to construction work on a problem in the morning, and lectures in the afternoon. I shall give only a general outline.

I. Each member should bring an original problem with him suitable for grade work. Perhaps two small problems could be brought.

II. He should be required to make a drawing of the problem and to trace it. Enough blueprints

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should be made from the tracing to supply each member of the class with one at the close of the session.

III. Each member should file his saw or saws and put all other tools that belong to the bench assigned to him in first class condition before he begins construction work. The shop should be presided over by a teacher of large and wide experience in shop and commercial work. He should be able to supervise and demonstrate as well as teach, able to advise as well as criticise. Here are a few things that he should know:

I. That a try-square is a left-hand tool.

II. How to sharpen a gauge.

III. Why the average boy cannot see a knife line.

IV. How to file a hand-saw so that it will cut true to a knife line.

V. Why a chisel makes a cork *screw spiral* when used to make a mortise.

VI. How to sharpen and *use* a bench plane to get the best out of it.

VII. How to fit a screwdriver so that it will do the work expected of it.

VIII. That elementary manual training can and should be taught without a miter box or bench trimmer.

IX. That a tenon or gain can and should be made without clamping on a block to guide the saw.

X. That a block plane is not a necessity.

XI. That a work bench is not a chopping block.

XII. That there is no such thing as a wood file for grade benchwork.

I have touched upon only a few of the weak points that need strengthening and these the instructor should be able to instil in some degree into each member of the class. Now, if that class could but catch a faint glimpse of what such a man can do for them and profit thereby, I would have no fears for them if they should find themselves up against Mr. A's proposition.

And now let us look in on Mr. A. If he has only one center we feel sure that he is quite busy, but the average city school system that is large enough to employ a teacher for seventh and eighth grade woodwork is large enough to have two or more centers, and so the chances are that Mr. A will be *very busy*. That first day comes all too soon and he looks into the faces of 24 or more live, wide awake eighth-grade boys. They are there for business and they are quick to note every change and every move that the new teacher makes. It is to the advantage of Mr. A to make a good impression, to come up to their standard; for we must admit that the average boy is keen enough to note every false move and to profit thereby.

This is a trying time for a new teacher, but if he has his gauges sharpened so that they will cut a line instead of plowing a groove; if his knives, planes, chisels, and saws are in good order; if he has plenty of material on hand; if he can demonstrate to the boys that he knows what he wants done and can show them how to do it, I predict that he will survive the first week. He may find that all this means work, but it is no disgrace to work. The best man that ever trod this globe of ours was a woodworker in His youthful days and afterwards became the greatest teacher known, altho He was not much of a lecturer. The records show that He preached but one sermon. He taught the multitudes by demonstration and the same method is good today.

It is the only method you *can* use to instruct the boy who never gets so that he can make a good mistake.

I can feel that someone is asking himself what problem should Mr. A use to start with, an *exercise* piece? By no means; that is too old and out-of-date. I would advise him to try a demonstration piece and keep at it until the boy can use the simple tools without danger of mutilation to the boy, bench, and tools. It is the hits on the target that tell of the quality of the man behind the gun.

After working with seventh and eighth-grade boys for a number of years, I can sum the matter up in these words. The average boy is a young animal full of life and energy looking for something to do. The history of manual training, theory, design, and a lot of like things have no charm for him and get lost in the dust that the boys kick up in the shop looking for something to *do*. I believe it is up to the teacher of manual training to furnish him that something to do and to see that material and problems are always at hand. It does not matter how they are furnished but they must be ready when wanted.

The things I have been saying are disjointed scraps that I have picked up by the bench side. Here is the last scrap: If the teacher has horse sense, if he has earned a livelihood as a journey-man for one year at the trade he is trying to teach, if he is just a little better than the best mechanics in his line, if he can speak good English, if he loves the boys he is trying to work with, then the first and greatest essential for a teacher of woodwork in the grades is an unlimited capacity to work, and the second is like unto it—to put on his overalls and work overtime.

VENEERING AND INLAYING

A STUDY OF MATERIALS, PRINCIPLES AND PROCESSES

G. M. Nyman, Cincinnati, O.

THE art of enriching objects by the use of rare and costly woods in the form of veneering was known and skilfully employed by artisans of a remote age.

In European museums and, undoubtedly also among collections of antique art in this country, curious examples of such work can be found. In many instances the veneer is fastened to the core with small wooden pegs and from this we draw the conclusion that glue was not known at that time, at least, not as a medium for fastening veneer to the core. The early craftsman method of veneering, judging from their work, must have been somewhat as follows:

After having cut his veneer to a thickness of from $\frac{1}{8}''$ to $\frac{1}{4}''$, he held it down on the object to be decorated and bored or cut small holes thru the veneer and down into the core a short distance. In these holes he inserted small pins or pegs made of the same material as the veneer. These pegs were wedge-shaped, with an elliptical head and concave sides coming to a point. When driven home, the points were firmly imbedded in the core, thus holding the veneer in place. Corners and edges are often reinforced with metal, this preventing the veneer from being stripped off, as well as serving a decorative purpose.

Later on, when the use of glue became known, veneering made rapid progress and some of the best pieces of antique handed down to us bear mute evidence of artistic skill and patience in the employment of veneering and inlaying of wood, metal, and other materials for surface decoration.

Some of the furniture known to us as "Period" furniture could not have been executed had not the old masters known the art of "building up"—gluing three or more layers of wood together in such a way that the grain in one layer always runs at right angles to that of the adjacent layer.

The employment of veneers forms a very important part of the woodworking industries today and some knowledge of the processes and principles used in this work will benefit all who work in wood and use glue.

Fig. 4 shows how a simple and pretty form of small picture moulding can be made where machines are available, or by hand.

The shoe *B* is rabbeted on the circular saw and the desired angle obtained. The mouldings are ripped to width, then placed on the shoe and run thru planer. This will give moulding the proper shape. If planer leaves ridges across the face of the veneer, remove same with a tooth-plane. Mouldings more than six feet long are cumbersome to handle and should be cut.

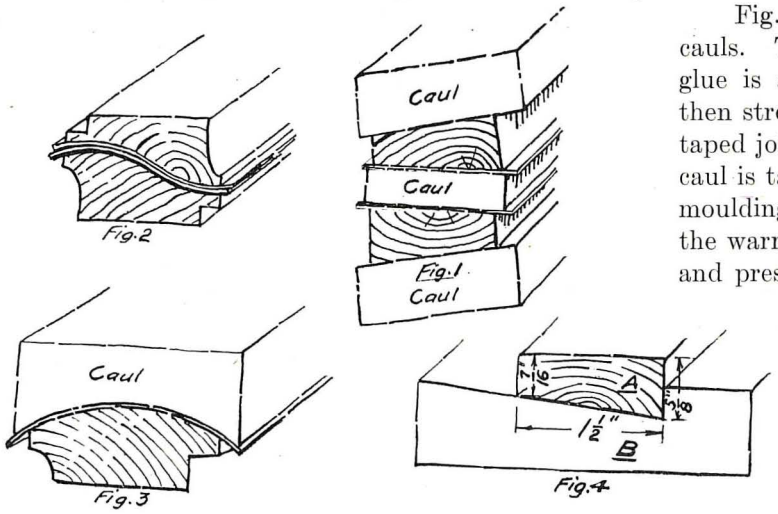
One thickness of veneer is all that is needed for these little mouldings and that is cut in strips across the grain $\frac{1}{4}''$ wider than the width of mouldings. In cutting, lay sheet of veneer on a board, mark off strips and cut after a straight edge with sharp knife or chisel.

If veneer is brittle and has a tendency to split, dip a brush in water and dampen the veneer slightly. Lay out the strips in the order of cutting, join ends and match.

In matching the aim is either to produce a strip of veneer seemingly without joints as in Fig. 6, or by turning one of the members over, a matched effect is obtained as in Fig. 5. The joints are held together with paper tape. Long joints are nailed down to a board with small brads previous to taping, but short joints can be held down with the fingers while the paper tape is glued on. When tape is dry, the veneer is ready to lay.

Fig. 1 shows arrangements of mouldings and cauls. The center caul is greased and heated while glue is applied to the mouldings. The veneers are then stretched over the glued mouldings with paper-taped joints on the outside. At this stage the center caul is taken from its heating place and put between mouldings to be veneered—the veneered sides facing the warmed caul. The outside cauls are then placed and pressure applied. These outside cauls could be eliminated on larger mouldings of same type, but are used in this instance to assist in even distribution of the pressure, and to prevent clamp markings on back of mouldings.

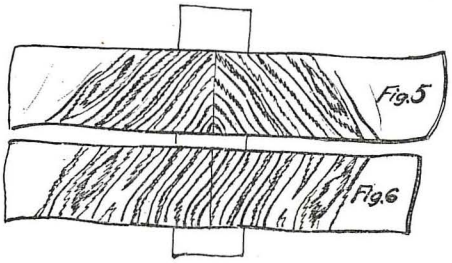
Fig. 2 suggests a moulding without the use of center caul. In this and similar cases, the mouldings themselves are heated



and the glue applied to them. The warm moulding will absorb considerable glue and this must be taken into consideration when glue is spread. Glue can also be spread on face veneer, but this should be avoided if possible. (See chapter on Glue.)

Fig. 3 is a suggestion for a plain flat-round moulding that will look well when veneered. It is advisable to veneer all these little mouldings before glass rabbet is cut, as there is danger of breaking same in the veneering if made previous to that.

To make these and similar mouldings by hand, run some $1\frac{1}{4}''$ screws thru a $1''$ board, place the screws



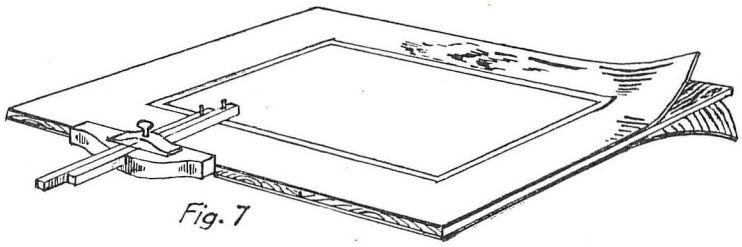


Fig. 7

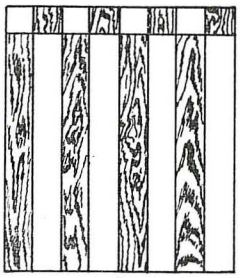
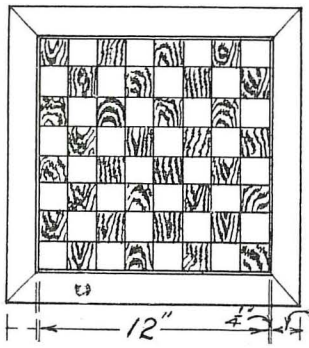


Fig.8



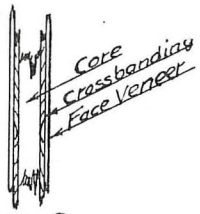


Fig.9

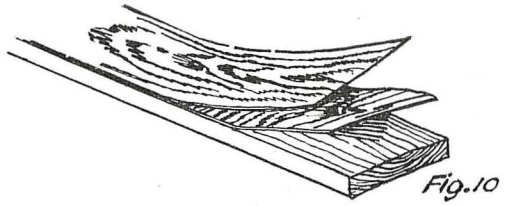


Fig.10

in line about one foot apart. Then file the protruding screw points so they will grip the blank mouldings when hammered down on them. The mouldings are then planed to the desired shape with a special moulding plane or in case of the round moulding illustrated, an old wooden smoothing plane can be converted into a moulding plane and will do good service.

Built-up panels are bought ready made and used for different purposes in many school shops, and rightly so. However, the value, educationally and otherwise, would be far greater if those who use built-up panels also had a chance to make them and there are few schools so poorly equipped that they cannot turn out some work of this kind. Take serving tray bottoms for example. All that is needed are two pieces of $2''$ surface planking for cauls of the length and width of tray contemplated (rarely more than 15x20); two face veneers (one for top and one for bottom) and a $3/16''$ poplar or birch core. The grain of the latter runs at right angles to the face veneers. Heat cauls a little while glue is spread on both sides of the core, which is then placed between face veneers and the whole placed between the greased and heated cauls, and pressure applied with heavy hand screws or clamps. If the cauls should have warped some during the heating, place the convex sides to the veneer, thus insuring pressure in the center first. About a dozen hand screws or clamps will give sufficient pressure for a panel of the size mentioned above. After six hours the hand screws can be removed and tray bottom taken out, trimmed to size and inlaid if desired.

To cut grooves for borders in veneered work, make a tool like the one sketched in Fig. 7, the most important parts of which are the cutters. These should be knife pointed so as to cut equally well across or with the grain. An old gauge block with set-screw arranged as in Fig. 7 will take care of the adjustments.

When face veneer is cut thru, the strips are removed with a small chisel, borders or lines fitted in and glued under pressure.

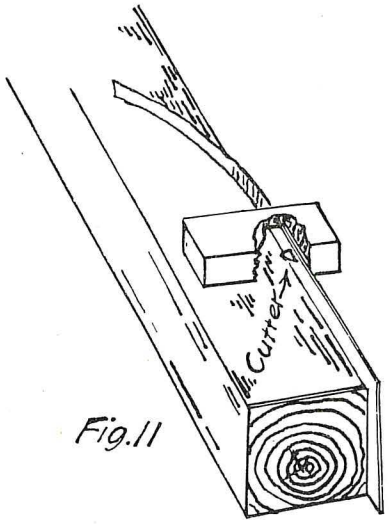
It takes three days for a veneered panel to dry and it should be kept clamped between sticks during this time, so that it will not warp while drying.

Face veneer is knife cut and smooth to start with and it does not take much scraping or sandpapering to make it ready for finishing.

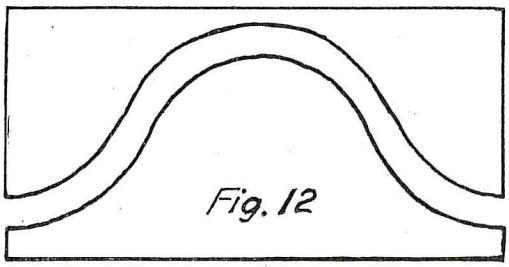
Matched panels, as illustrated in Fig. X, should be made five-ply in order to stand up. The gluing of a five-ply panel is no more difficult than the three-ply previously described. In order to make such a panel it is necessary to have four successive cuts of veneer from the same log in order to match the face veneers. The veneers are then joined, fastened on the board with brads and the joints taped as previously described.

Checker boards are very popular with school boys, but if they are glued up of solid blocks without any backing, the life of the board will be short, as the expansion and contraction will open up the joints. Five-ply veneer checker boards have proven to be more permanent and are not hard to make.

Two pieces of veneer, one dark and one light, are ripped into eight strips, each $1\frac{1}{2}''$x14". It is important that these strips are of the same width and in order to get uniform widths, make a jig for that purpose as illustrated in Fig. Y. If a fine power saw is available, the strips can be ripped on same.

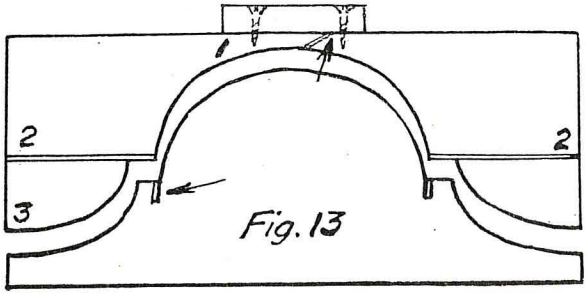


The strips are then alternated, fastened to a board with brads and paper tape glued over the joints. When dry cut off eight strips across the grain (see top of Fig. 8), alternate and tape together again as shown. When dry, join edges and mitre borders or lines around, fastening same with paper tape to

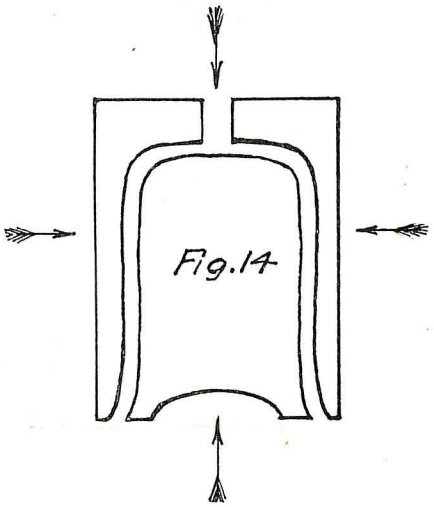


the checkers. This finishes the face veneer of checker board. Now cut back veneer, two cross bandings and core of same size as face veneer, and glue together as shown in Fig. 9.

Table rails are easy to veneer and will serve as well as solid ones if they are made like Fig. 10. They can also be veneered with a single veneer, but they have a tendency to warp. Table legs glued up and veneered with $\frac{1}{8}''$ veneer (see Fig. Z) have many points in their favor.



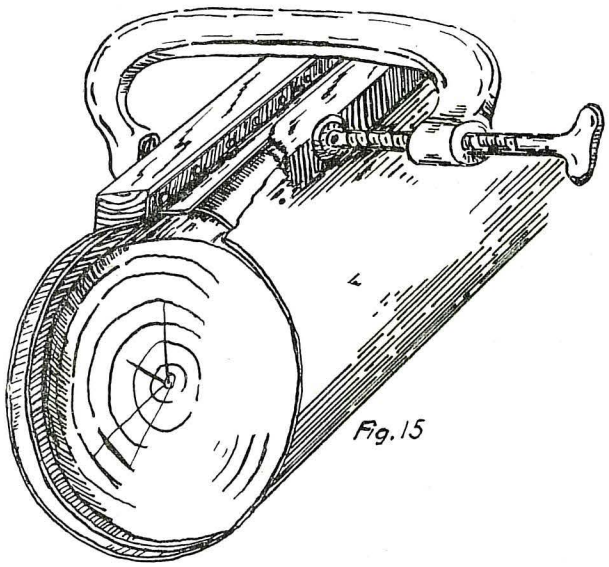
The veneering of curved objects is more difficult. Figs. 12 and 13 shows some mounts for small clocks. These must be band-sawed carefully so that the waste pieces can be used for cauls. Fig. 12 is the least difficult to veneer and the curved part can be done in one operation. In this case, it is best to veneer ends first, then curved part and finally the face. Fig. 13 is more difficult to saw out and to veneer. The first cuts are made at Fig. 2, next cut from arrowhead on top to other arrowhead, then at Fig. 3. The veneering is done in this order: The veneer is let into kerfs cut at lower arrowhead and glued in place. The



ends, coves, fillets and face are veneered in the order mentioned.

In order to veneer pieces having curves of small radius, (Figs. 13 and 14) it is necessary to dampen and bend the veneer to the approximate shape of the object. This is readily done by dipping the veneer in water and bending it over a hot steam or gas pipe. If there is a little glue in the water, the veneer will keep its shape better.

Arrowheads in Fig. 14 indicate the direction of pressure to be applied when veneering.



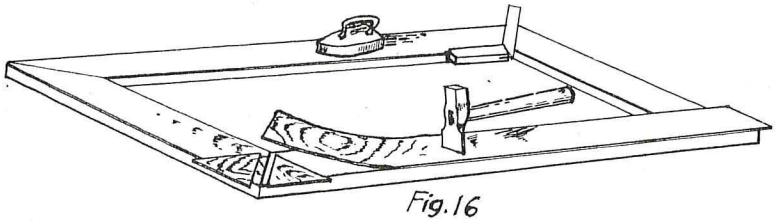


Fig. 16

No dimensions are given for these clock suggestions because it will be found best to get the movements first and make the cases to fit them. Any jeweler can get movements from makers or wholesalers and these range in price from 75 cents up.

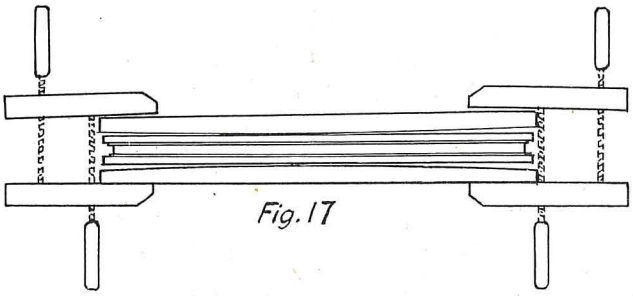


Fig. 17

Fig. 15 illustrates the method of veneering round columns. A piece of sheetmetal, aluminum or zinc with two strips of wood securely fastened to the edges is heated and clamped around the object to be veneered, leaving a little space where veneer laps without pressure. This is later reheated, jointed and pressed down.

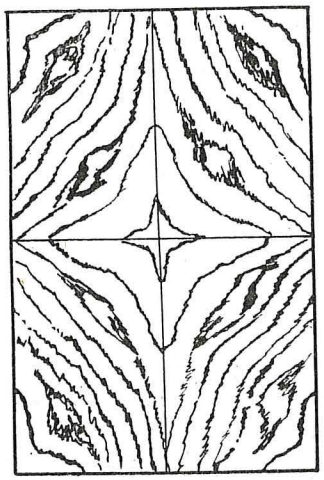


Fig. X

Veneers range in price from a fraction of a cent to 80 cents per foot or more. Dealers are located in all large cities and they accumulate what are known as "dead samples," meaning only a few of the same log on hand. These can be purchased for one to

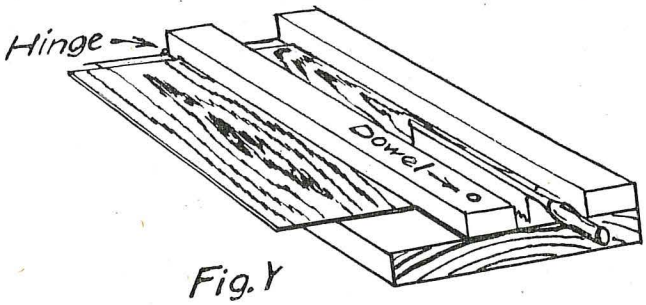


Fig. Y

two cents a foot. Cross banding costs from one-quarter cent up. Poplar core costs about one-half cent a foot.

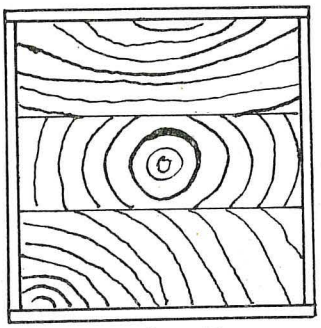
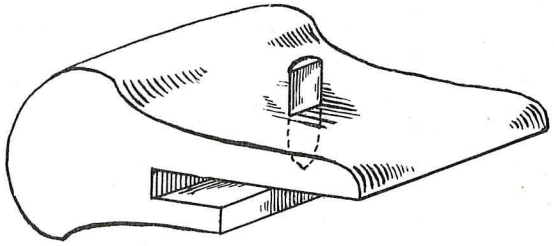


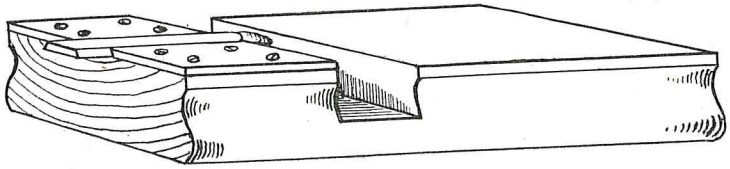
Fig. Z

The Ohio Veneer Co., of Cincinnati, O., will be glad to supply veneers. J. B. Bernard Co., 422-30 East 53rd St., New York City, will be pleased to supply lines, borders and insets at a reasonable price.

(To be continued.)



Tool for Trimming Surplus Veneer Edges.



Tool for Trimming Off Surplus Veneer Edges.

A Defense in High-School Woodworking

C. E. Howell, Director of Mechanic Arts, Public Schools, Decatur, Ill.

IN the December issue of the *Industrial-Arts Magazine* there appeared an editorial entitled "High School Woodworking," in which the place of woodworking in the high school was questioned. In brief, the editorial made the assertion that manual training is considered by some as a method of teaching; by others as giving pupils a degree of skill which may be utilized in the earning of a livelihood; and by the Eastern Arts Association as enabling the boy to choose his lifework somewhat intelligently and, where that has been done, as assuming a purpose which is purely vocational. The editorial reaches the conclusion that high school woodworking does not meet these requirements, and does not prepare for pattern-making, carpentry, or cabinet-making, and ends with the statement that "A vocational course in woodworking is therefore an absurdity."

Now it seems to me this constitutes a very distinct challenge to those of us who have been, and are, sanctioning the teaching of this subject in our high schools. I, for one, do not propose to let such a statement go by unanswered. I believe I appreciate the problem which the editorial seeks to present, but, while I admit it is a perplexing one I cannot, in the light of my experience, bring myself to agree with the apparent conclusion reached. I believe that the requirements set forth may all be met without any inconsistency. The whole thing hinges on the fact that woodworking should be in the high school to meet a need of the pupils. If that need does not exist, or if woodworking does not meet it, then indeed woodworking should not be there. No discussion of this topic can be complete unless it is constructive as well as critical, consequently I propose to tell, in a brief way, how the manual training course in one high school was organized, including the woodworking, and to give the results obtained, believing that this will be the most adequate and effectual reply to the editorial in question.

In organizing what was officially known as the Mechanic Arts Course we assumed that the entire manual training curriculum, including wood, metal, and the other subjects, was there to meet the practical needs of real pupils, so we resolved our field into the following groups of boys whose requirements we felt we must try to meet:

(1) The boy who cares nothing about academic work, and would not come to high school if he had to take it.

(2) The boy who would start, but drops out at the end of two years or less (a very large per cent of the whole student body).

(3) The boy who would finish high school, but goes no farther in his education.

(4) The boy who would go on to college or university.

Thus it became our particular problem to meet the needs of *all* these groups within the scope of the one so-called Mechanic Arts Course, in a cosmopolitan high school of about eight hundred pupils.

To cover the requirements of group one, we utilized an official clause adopted by the school authorities whereby any boy might come into the high school and take *shop work only*, upon condition that he secure the approval and permission of the principal. This gave a flexible rule capable of interpretation in conformity with the administrative policies of the school, and entirely adequate to the conditions involved.

In considering group two, it at once became evident that, in the brief two years or less which would be available to the boys of this group, it would be impossible to work out any scheme which would give any considerable degree of skill in any one line, because of the lack of adequate time. More than this, few of the boys would know what line they were most interested in, or in what they wished to specialize. Consequently it appeared impractical to accent any one thing too much, while at the same time it was highly desirable to give as varied and as great skill as possible in the short time allowed, because these boys would probably have to rely very largely upon manual dexterity, in one form or another, as a means of earning their livelihood after dropping out of school. We arranged their course, therefore, in a manner to make it largely discoverative in the first year or two, i. e., to give them a great variety, crowding those years as full of shopwork as we dared; putting off as much academic work as possible until after that time.

It was imperative that group three should be fairly sure of what line they wished to take up before they commenced to specialize. Also it seemed advisable that they should know a little about the complementary trades allied with their own. Therefore we assigned them the same work as group two for the first one and one-half or two years, after which they made their choice of trades and specialized for the remaining two years.

The boy in group four would, of course, need more collegiate-preparatory academic work than the one in group three. However, it might frequently happen that the boy in group three would change his mind and wish to go on to college after all. To cover this contingency the course for group three was laid out so that the student could easily satisfy

the University of Illinois engineering entrance requirements, provided he had chosen his elective subjects wisely, and had not flunked too often. This meant that he could have done all this while at the same time carrying out his scheme of trade specialization. In a way, therefore, the treatment of groups three and four was similar, group four taking practically the same shopwork as group three, with the difference that from the first they were particularly careful to make their academic electives such as would be accredited toward entrance requirements at the university.

An emergency clause was provided for both groups three and four by designating some of the shopwork in the Junior and Senior years as Special Elective. This Special Elective had to be shopwork unless some urgent reason arose for changing to academic work. Thus if a student came up to his Senior year in group three, and then decided to go on and enter college, he *could* be given permission to devote the entire year to entrance credits. Or, if a student in group four was failing to make his entrance credits because of poor advice, or mistakes on the part of the faculty in laying out his program in previous years, he, too, by special permission, could devote his entire time to academic requirements. *But,* if a student was to lack credits for graduation or entrance by virtue of his own fault, i. e., thru past failures in subjects, or deliberate, obstinate wrong choices, he was held to his shopwork and not excused. Thus the use and abuse of this Special Elective clause was kept entirely within the control of the school administration.

Having explained how we took care of these four groups within our own course, there remains unaccounted for only the large number of students in other courses in the high school who wished to elect some shopwork. To care for them we made all shop subjects as freely elective as we could, with just as little pre-requisite requirement as possible. By holding them to the same reasonable standard of efficiency as that demanded from our own boys we were able to give them full credit for past shopwork accomplished should they at any time wish to change over into our course.

We found the above scheme elastic, adaptable to all the needs described, and yet firm enough to result in turning out most excellent workmen; workmen who had good elementary training in the foundation essentials, where their stay in school was brief, and who had excellent trade beginnings for the wood and metal industries, where they remained with us for the full four years. These results are not theoretical, but are being proven by the work of our graduates, both in the trades and in the advanced technical schools where they have gone.

I shall not try to list the individual shop subjects taught, because that is largely a matter of facilities, and of individual situations and opinions which can be adjusted as occasion demands. In skeleton the plan outlines as follows:

(Cosmopolitan high school with a manual training course.)

Note: Course consists of certain required subjects, and a certain number of Electives for each semester. Everything else being equal, pressure is brought to bear upon the student to make his Electives largely academic.

First Year—

As varied as possible, embracing some work in all shops. Work should be thoro. Academic subjects confined to those considered absolutely essential, devoting extra time thus gained to shop work.

Second Year—First Sem.

A continuation of the first year, with possibly a slightly greater accent on Academics.

Second Year—Second Sem.

Specialization *may* start here, or this may be a continuation of the preceding semester.

Third Year—

Specialization, or trade training, should start here, with accent on factory methods. Special Elective (Shopwork unless excused). More stress on the Academic.

Fourth Year—

Continuation of the third year, with special regard for college entrance if desired.

Experience taught us that it was wise to see that practically all four-year students have the entrance requirements for engineers at the University of Illinois. This was not made obligatory, but our influence was thrown that way.

In any plan such as the above it is well to have all shopwork very thoro right from the first, so that there may be no reconstruction later on when specialization comes, but rather a steady continuation of skill, and a building upon knowledge already gained. Indeed it is wise to start correct habit formation down in the grades if possible. Manual training as play or mere recreation had no place in our work as outlined above. One of its largest educational values, and certainly the largest trade value, lay in the acquiring of thoroly workmanlike methods and results.

Not one of the least of the advantages afforded by this scheme is that it made possible the setting aside of one semester when repair and construction work for the schools could be done. That is, it permitted the giving of school work to an advanced class of pupils who had been trained to the point where they were competent to handle it creditably. Thus, also, it kept the school work from interfering with the elementary classes where definite, evolutionary planning and advancement were so vitally important. In our woodworking, for instance, the first attention

was given to the use of hand tools and processes, until the pupil was fairly competent with them. All stock was glued up by the student, and sanded by hand. Later on, as soon as the hand processes were fairly well mastered, the use of the machines was brought in, and in the specializing of the last two years all emphasis was put upon factory methods for the economy of time and labor. Here the gluing might be ordered done at the mill, and the sander, as well as all other available machines, was used whenever possible.

In conclusion. By the flexibility of the four-group plan outlined; by the comprehensiveness of it which permits it to be used as a *method* of teaching, while at the same time it is giving the pupils a *degree of skill* which may be utilized in the earning of a livelihood; by the fact that it aims to enable the boy to *choose his lifework somewhat intelligently*, while for those who have determined upon an industrial occupation *the purpose becomes purely vocational*; by all these facts which enable a boy to become a pattern-maker, a carpenter, or a cabinet-maker, and which form a blanket answer to all the requirements laid down in the editorial under consideration, I maintain that this plan at least approaches the solution of the problem of the place of woodworking, as well as some other shop subjects, in the high school. I would not claim perfection for it, or impossibility of improvement, but I do think that in its ability to meet the needs as I see them, it is basic, and may go far toward answering the questions raised.

It should be unnecessary to add that the content and conduct of the individual shop classes and courses must be planned and carried out in sympathetic harmony with the scheme as a whole. Unity of purpose and efficiency of methods are necessary to the successful working of a plan as elastic as this is. Its very elasticity would make it subject to abuse by unintelligent instructors who fail to harmonize with the guiding purpose of the whole.

THE DESIGN OF A BENCH GRINDER

August P. Gompf, Instructor, Industrial Arts Department, State Normal School, Bowling Green, O.

THIS problem was taken up as the work of the second half-year with a second year class in mechanical drawing in East Orange, N. J., High School. The first half-year had been spent in making the detail drawings of a machinist's vise. A number of these vises were borrowed from the metalworking shop, disjoined, and the parts distributed among the members of the class. By exchanging with one another each boy was able to make the detail drawing of each part of the vise. This reviewed the work of the first year in projection and familiarized the class with some of the drafting room conventions and practices. Tracings and blueprints were made from the detail drawings.

In introducing the grinder problem reference was first made to the grinders in the woodworking shop and in the machine shop. The fundamental parts of the machine were noted as follows:

(1) An abrasive wheel mounted on a shaft.
(2) Shaft supported near each end by bearings.
(3) Bearings cast as a part of the column which rests on the floor.
(4) Shaft turned by means of a pulley belted to a line shaft or motor.

Note was also made of the high rate of speed.

The problem was then presented: To design a grinder which may be bolted to the top of a bench and driven from a line shaft making 250 R. P. M., and which shall have a tool-rest capable of adjustment for height and inclination to the stone. Individuality in the designing was emphasized; to promote this from the start different diameters for the driving pulley were assigned to different boys.

The first step was to determine the diameter of the driven pulley. To find this it was first necessary to know the speed in R. P. M. of the grinder. This was determined by referring to a handbook for the efficient working speed in feet, per minute, of the abrasive chosen by the boy and, after choosing arbitrarily 6 inches as the diameter for the grinder wheel, this speed was reduced to R. P. M. Then after a discussion of the relation of the sizes of the pulleys to the transformation of the speed, the following formula was deduced:

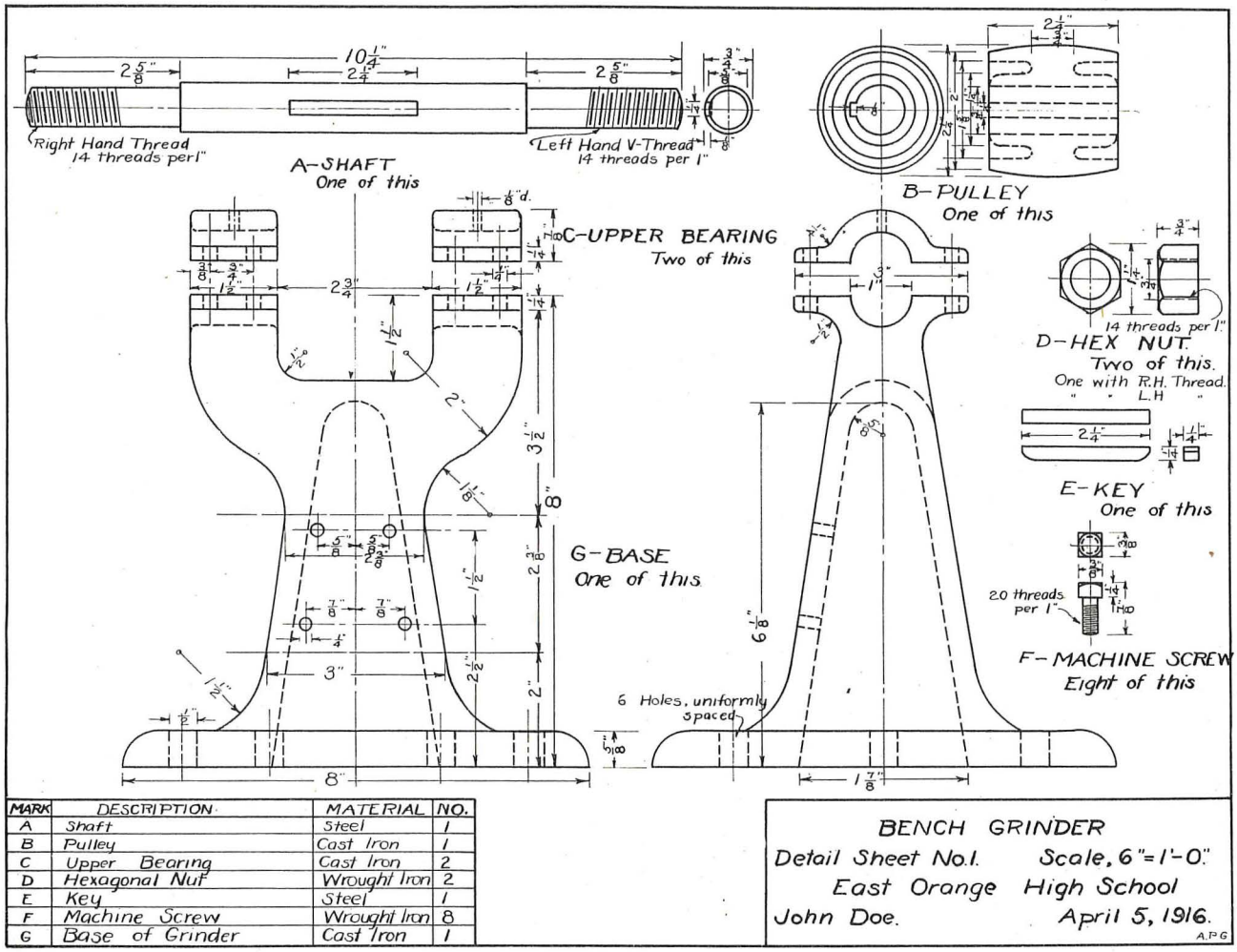
$$S : S' :: D' : D,$$

where S is the speed in R. P. M. of the line shaft,
S′ is the speed in R. P. M. of the grinder,
D′ is the diameter in inches of the driven pulley,
D is the diameter in inches of the driving pulley.

Each boy then applied this formula to his particular problem and determined the diameter for his driven pulley.

The purpose and working principle of crowning the pulley was discussed.

The next step was to mount this pulley on a shaft. A number of methods of fastening pulleys on shafts were named by the boys and the merits of each were discussed. The method of using a key and keyway was finally chosen as the most satisfactory for the case in hand. Most of the boys were particularly prejudiced against the set-screw method of holding the pulley fast to the shaft. They were at the time having experience with the wood-turning lathes in



MARK	DESCRIPTION	MATERIAL	NO.
A	Shaft	Steel	1
B	Pulley	Cast Iron	1
C	Upper Bearing	Cast Iron	2
D	Hexagonal Nut	Wrought Iron	2
E	Key	Steel	1
F	Machine Screw	Wrought Iron	8
G	Base of Grinder	Cast Iron	1

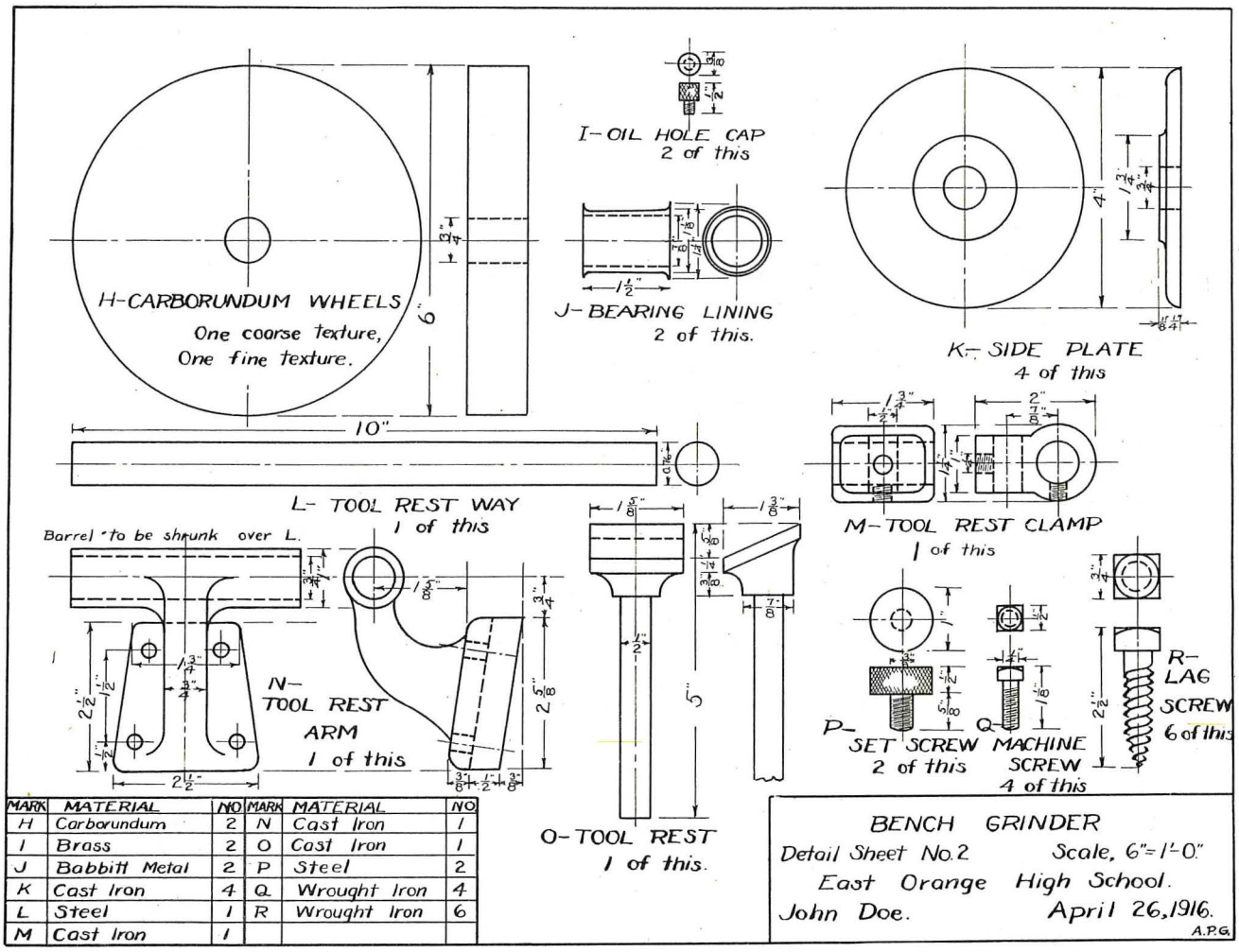
the shop, in which this method of fastening the pulley is employed, and were constantly annoyed by the set-screw working loose, allowing the pulley to slip on the shaft.

The diameter for the shaft was chosen arbitrarily since these boys had not sufficient mathematical basis for a study of the mechanics of materials and forces involved.

With the pulley on the shaft the next step was to mount this shaft in bearings. Since the bearings were to be a part of the cast-iron frame of the machine the necessity of lining them with some more frictionless material was discussed; also the necessity of being able to remove and replace these linings once they became worn. The class named several bearing materials which they remembered having seen, used or heard of and after discussing the qualities of all of them, it was decided to use babbitt metal for the linings of the grinder bearings. In discussing the necessity of being able to remove the worn lining someone suggested that the bearings be split to facilitate this operation. The idea was taken up immediately as it was apparent that this would also facilitate the assembling and disjoining of the whole machine. The matter of providing for oiling was taken care of by drilling a hole thru the top of the bearing, tapping out the upper or outer end of this hole and closing it with a thumb-screw.

In order that the edges of the pulley might not wear on the side of the bearing a little space was left between them. If left this way, however, the shaft would wobble back and forth, it was argued. So, to take up any movement due to these spaces brass bushings were fitted into them. It was pointed out that these bushings could easily be removed and replaced once they had become worn enough to allow any play of the shaft back and forth.

The next step was to mount the grinder wheel, or wheels, on the shaft. Some boys chose to mount two grinders, a fine grained one and a coarse grained one. Others decided to mount a grinder and a buffer. It was decided to back up both the grinder and buffer wheels with a cast-iron plate on each side of the wheel. For making the wheels fast on the shaft it was suggested that the ends of the shaft could be threaded and a nut put on and tightened against the wheels if some stop were provided to prevent the wheels being tightened against the bearings. Three forms of stops were suggested—(1) a pin thru the shaft, (2) a collar fastened on the shaft, (3) reducing the diameter of the shaft at the ends, leaving a shoulder just outside the bearings. After discussing the dis-

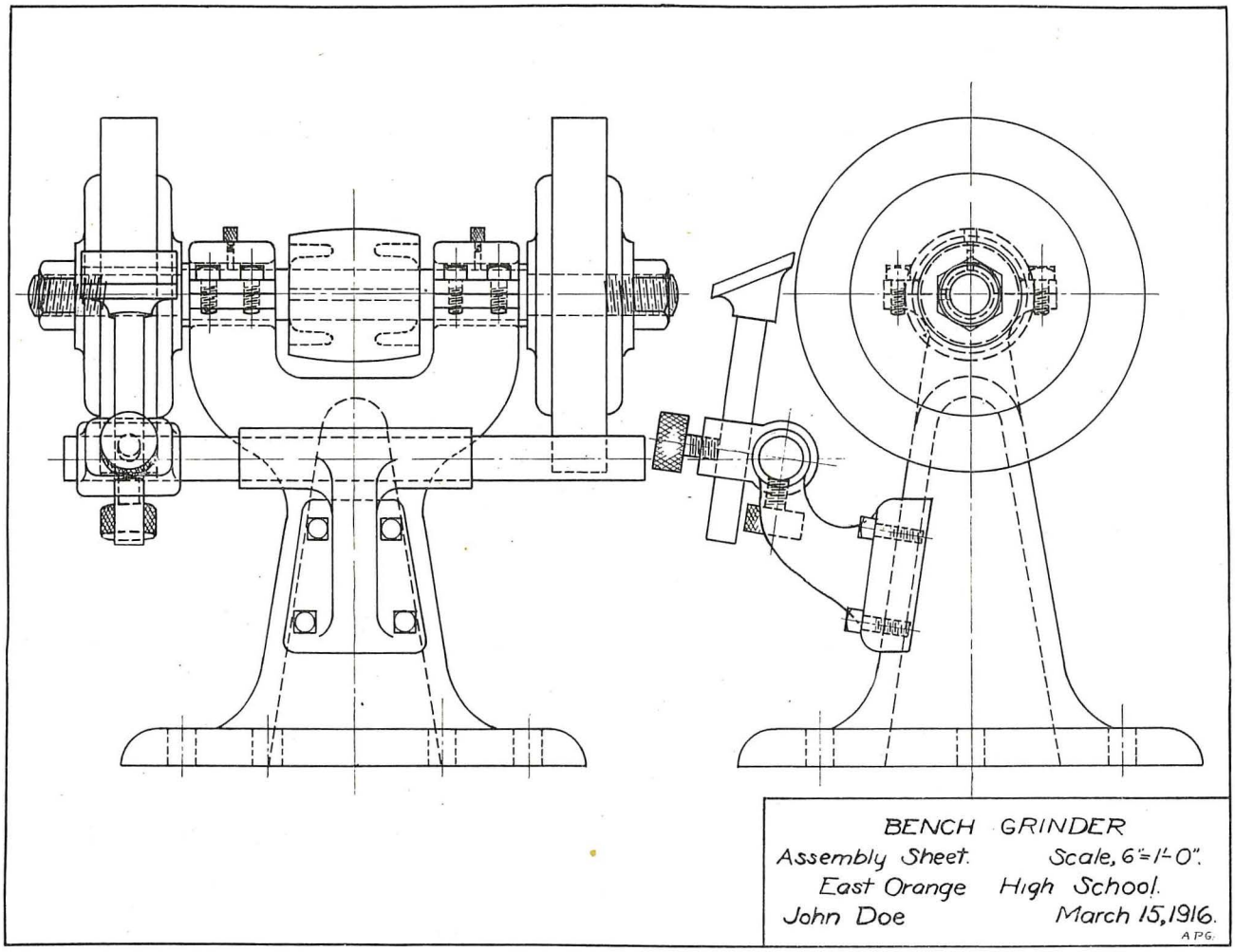


MARK	MATERIAL	NO	MARK	MATERIAL	NO
H	Carborundum	2	N	Cast Iron	1
I	Brass	2	O	Cast Iron	1
J	Babbitt Metal	2	P	Steel	2
K	Cast Iron	4	Q	Wrought Iron	4
L	Steel	1	R	Wrought Iron	6
M	Cast Iron	1			

advantages of the first two the latter was adopted, and the diameter of the shaft was reduced at the ends to $\frac{5}{8}''$, it being $\frac{3}{4}''$ in the middle and thru the bearings. The matter of whether the threads at the end of the shaft should be right-hand or left-hand was the cause of a heated discussion. The entire class soon decided that one end must have a right-hand thread and the other a left-hand thread, but there was a decided difference of opinion as to which thread for which end. One group argued that the grinder wheel in turning toward the operator would tend to turn the nut in that direction also and that therefore the nut should tighten in that direction. The other group argued that the thread ought to be the same as that used in holding the face-plate on the lathe and that that turns away from the operator. When the real conditions of the tool thrust against the wheel being transmitted to the nut and tending to hold it stationary and the shaft tending to turn within the nut, were explained, it was clear that unless the direction of the thread opposed that of the shaft, the shaft would tend to screw itself out of the nut, and that therefore the thread must turn away from the operator. And it was soon agreed upon then, that the thread on the end of the shaft at the operator's right should be a right-hand one, while that at his left should be a left-hand one.

Then came the designing of the column to support all of this. Some of the students designed columns which were circular in cross-section; others worked out square and rectangular columns. All were flanged sufficiently at the base to provide stability for the machine, and also to facilitate in bolting them to the bench. All were cored out; leaving a shell averaging about $\frac{3}{8}''$ in thickness.

Of the tool-rests there were a number of fundamentally different types. A number of the boys used the idea of an arm projecting from a plate which was bolted to the column, and to which the tool-rest proper was fastened by means of a thumb-nut and screw which permitted of an adjustment up and down and to any angle. Several boys worked up the idea of an arm hinged to the column in shutter hinge fashion so that the tool-rest could be swung to either grinder wheel. Once in position it was secured by means of a thumb-screw. One boy enclosed the grinder wheels in a case and fastened the tool-rest to this casing. Several boys who used the "arm on the column" arrangement, used a knuckle joint for the adjustment of the inclination.



In connection with the design of the column and general framework the question of the material used gave opportunity for talks on the reduction of iron from the ore, the operation of the blast furnace, of the cupola, and the production of steel. Some of the boys were somewhat familiar with some of these operations and they had numerous questions to ask and these added to the interest of the whole group.

The complete problem involves the working out of the assembly drawing, making detail drawings, and tracing and blueprinting them. The use of sectional views when necessary for the clarification of the drawing, the application of drafting room conventions, systematic dimensioning, and careful lettering, are points that are emphasized from the standpoint of mechanical drawing technique.

A LIVE HIGH SCHOOL ART PROBLEM

Douglas Donaldson, Los Angeles, Cal.

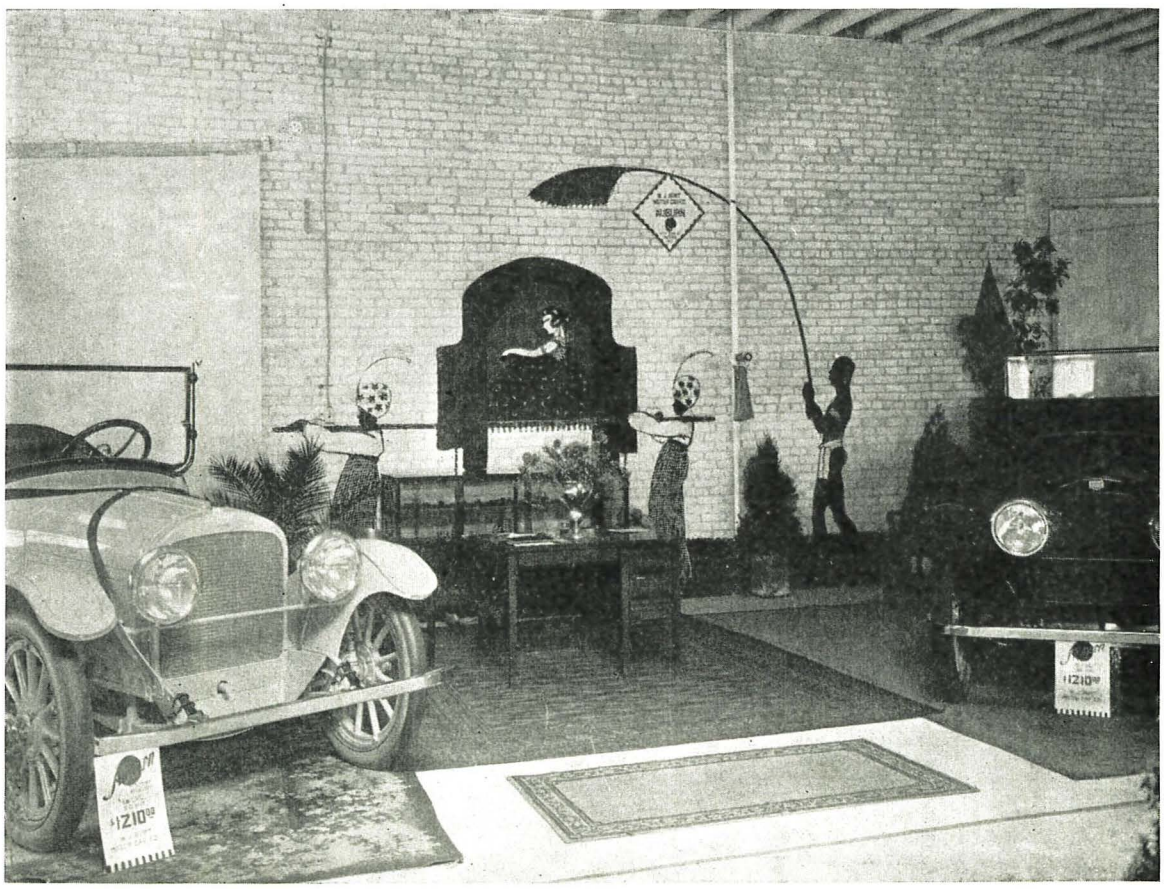
WHEN the exhibition committee of the Los Angeles Motor Car Dealers' Association was about to form tentative plans for their annual "Auto Show" it occurred to some reckless member to suggest that the art department of Manual Arts High School submit a plan for the decoration of their 80,000 square feet of floor space; the problem being to create an attractive background for the exhibit of automobiles.

The idea appealed to the art department very much. The director over night worked out a scheme on paper and drew up a rough draft of expense which was duly submitted, with the plan for decorating, and accepted by the committee. It was agreed that the art department should be taken on as if they were a decorating firm, and all parties paid a fair wage for their services. The total estimate for decorations amounted to about $2,000 with an additional $1,000 allowed for the rental of greenery.

The head of the art department became the decorator in chief and he in turn named his student assistants, decorators, decorator's assistant, business manager, and foreman respectively.

About three weeks' time was allowed to decorate the building two hundred feet long, ninety feet wide

Showing the Use of Cut Paper to Enrich the Architectural Features of the Building.



Typical Wall Decoration in Building Painted Directly on Brick Wall in Flat Masses of Black and Vermilion with Small Spots of Gold.

and three floors high. In addition, on an adjacent lot was a tent about two hundred feet square with side walls ten feet high. Needless to say the decorative scheme had to be thought out quickly and resolved itself into the adaptation of decorative ideas selected or originated very largely by the decorator-in-chief. The student decorator, however, was a student of rare talent who always caught the spirit and never failed to add charm and interest to the rather hasty and roughly outlined plans. His understanding of the technique of painting on glass with transparent colors and his general ability as a draftsman made the undertaking possible.

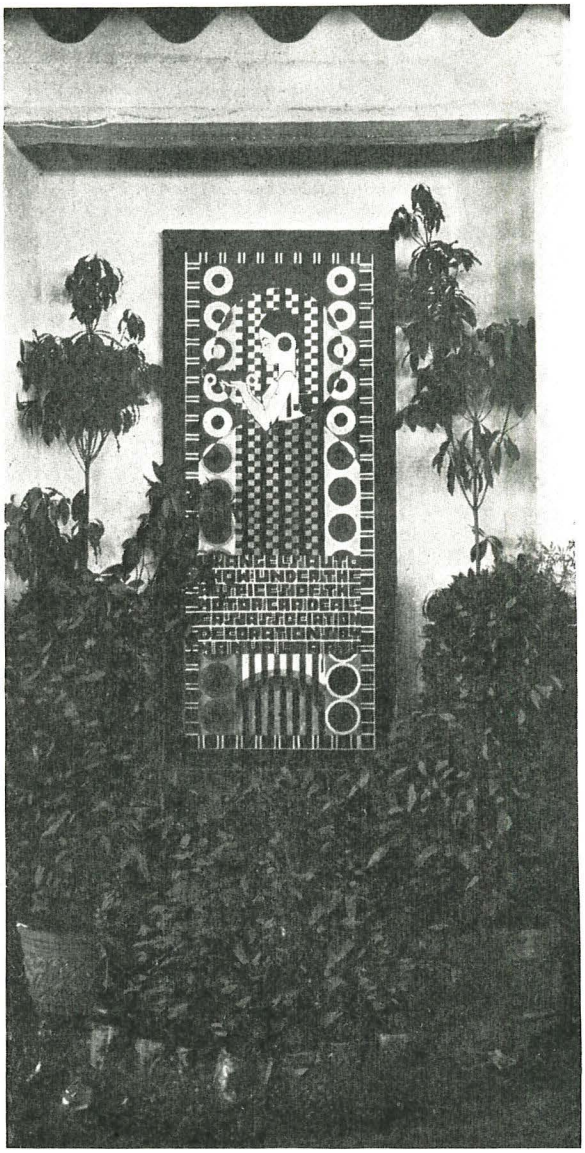
As the decorator-in-chief was obliged to teach school, the execution of the plan fell entirely upon the students, several of whom were given leave of absence from school for a period of two weeks. Most of the straight-ahead technical work was done by groups of students working after school under the direction of the foreman, their pay and time being kept track of by the business manager. The business manager besides acting as chauffeur to the chief, had charge of all financial matters including the purchasing of materials and keeping the payroll.

As the tent was a big, beautiful, brand new, pure white affair, and the building spotless white from top to bottom, it seemed natural to use black and white for the main idea. To this was added a rather generous accent of geranium vermilion.

The decorative effect was obtained by striking contrasts of black and white in interesting arrangement and composition. To a very formal and conventional plan were added a number of enriched spaces and occasional touches of humor such as a grotesque monkey climbing up a three-story palm tree in the elevator shaft and sketches adapted from the charming black and white drawings of Kay Nielsen.

As a business proposition the association paid into the hungry pockets of some sixty or seventy boys $785 and a few extra dollars for the horticulture man and the chief.

As an artistic opportunity it gave the art department a chance to compete with professional decorators, and to demonstrate its theory of design in a practical way. And now that it is all over and the group has caught up with lost sleep they take great satisfaction in the fact that the proof of the pudding is in the eating, and "Manual Arts" has been asked to think about a scheme for next year.



Decorative Poster Placed in the Main Hall of Building. The Work of John Cahana, Student Decorator. A Colored Light was Thrown on This Panel From Below.

HE is the best artist who feels a thing most nobly and most beautifully. He is the best technician, whether with the brush of the painter, the shuttle of the weaver, the chisel of the carver in wood, or the hammer of the worker in metal, whose tool most readily and most vitally expresses the thought of his brain, who feels least the limitations of an artificial idea of finish.

—*Theodore C. Steele.*

Development of Water Colors in Primary Grades

Sixth Article

LANDSCAPE

Martin F. Gleason, Supervisor of Art and Construction, Joliet, Ill.

Grade II

AFTER children have gone thru the development outlined for the first grade they should have at hand a certain amount of skill and experience upon which to base the work of the second grade. In summing up the work of the first grade we find the following: Children have been taught to paint in flat and graded sky washes; they have been taught how to produce level land and hill effects and how to paint in distant foliage. They have also had an opportunity of learning the value of the narrow line left between the distant foliage and land spaces.

If children entering the second grade have not had the above development, the teacher who is to have charge of them during the second year will do well if she finds out what they have had, and makes the most possible of their previous experiences. Nothing will do more for the welfare of any subject than a feeling of responsibility on the part of children toward that subject, and it is the business of the teacher to find out what has been taught in grades previous to hers and hold children to these things. Of course, we all know that from year to year children forget much and should be led back to forgotten points thru review. In a review of the work of first-grade methods of handling the brush and color should be watched with care. An improvement in the handling of both of these should be expected and demanded.

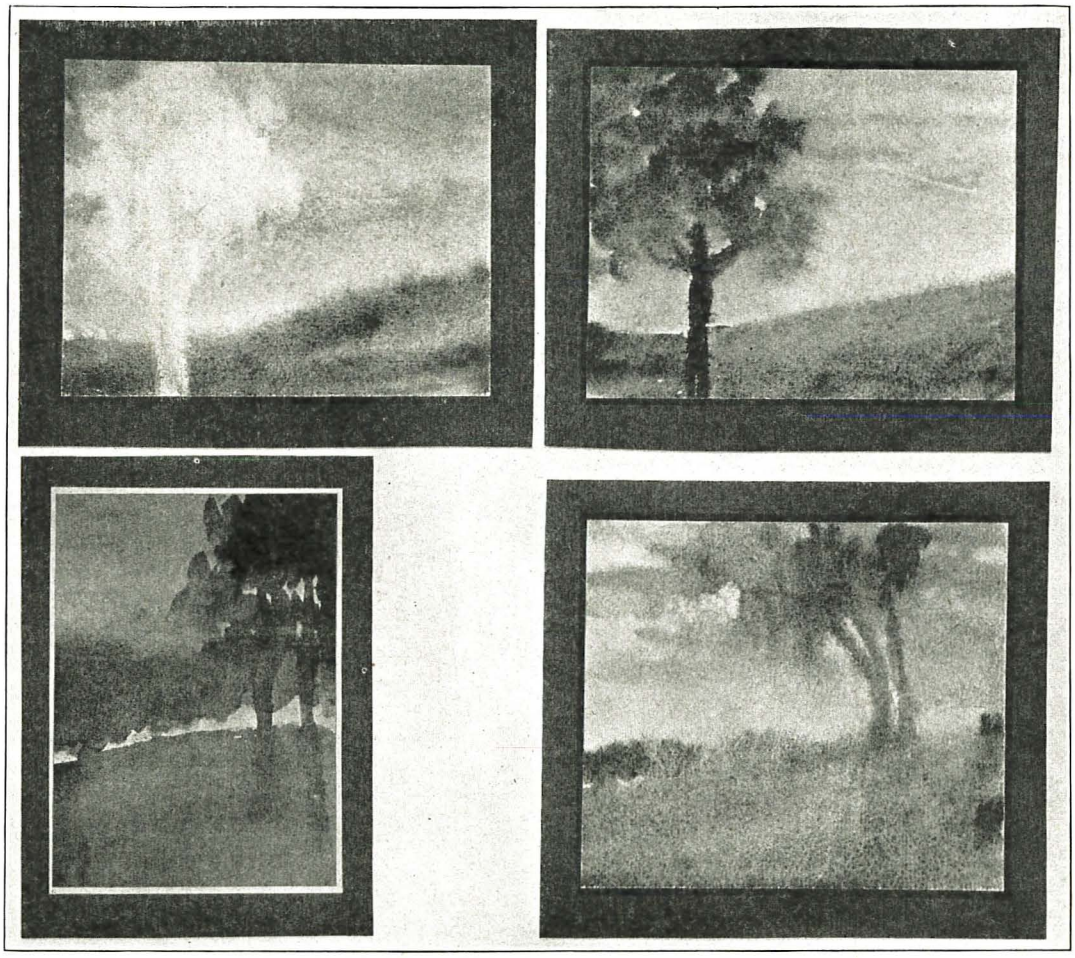


PLATE XXXII.

Top Row—Figs. 1 and 2. Bottom Row—Figs. 3 and 4.

The power to control color should be pretty well developed in children who have had a year's experience with the medium. If such is the case children of the second grade are quite ready to begin painting in trees. The placing of the tree—and it seems wise to use only one tree when introducing this point—should be discussed and illustrated by the teacher, before the children are ready to paint. The breaking

up of the edges of the foliage, as suggested in the work of the first grade, should be illustrated. When painting in the foliage of the tree, place it high in the sky space in order to prevent the mass of color used here from coming into contact with any other mass, such as distant foliage or land. This will help greatly in the retention of shape in all masses of color and in the tree trunks. Also, it will be found very much easier to put in a few important branches against a sky space than in the foliage of trees.

any good work until the brush has been cleaned and reshaped. Put a drawing such as Plate XXXIII suggests on the board where children may see it and be reminded of the necessity of a well-shaped brush.

When the shapes of the trees are sufficiently wiped out, the color desired may be painted in. Show the children how to use the point of the brush in doing the trunks and branches. If the brush is brought down along the middle of the space for the

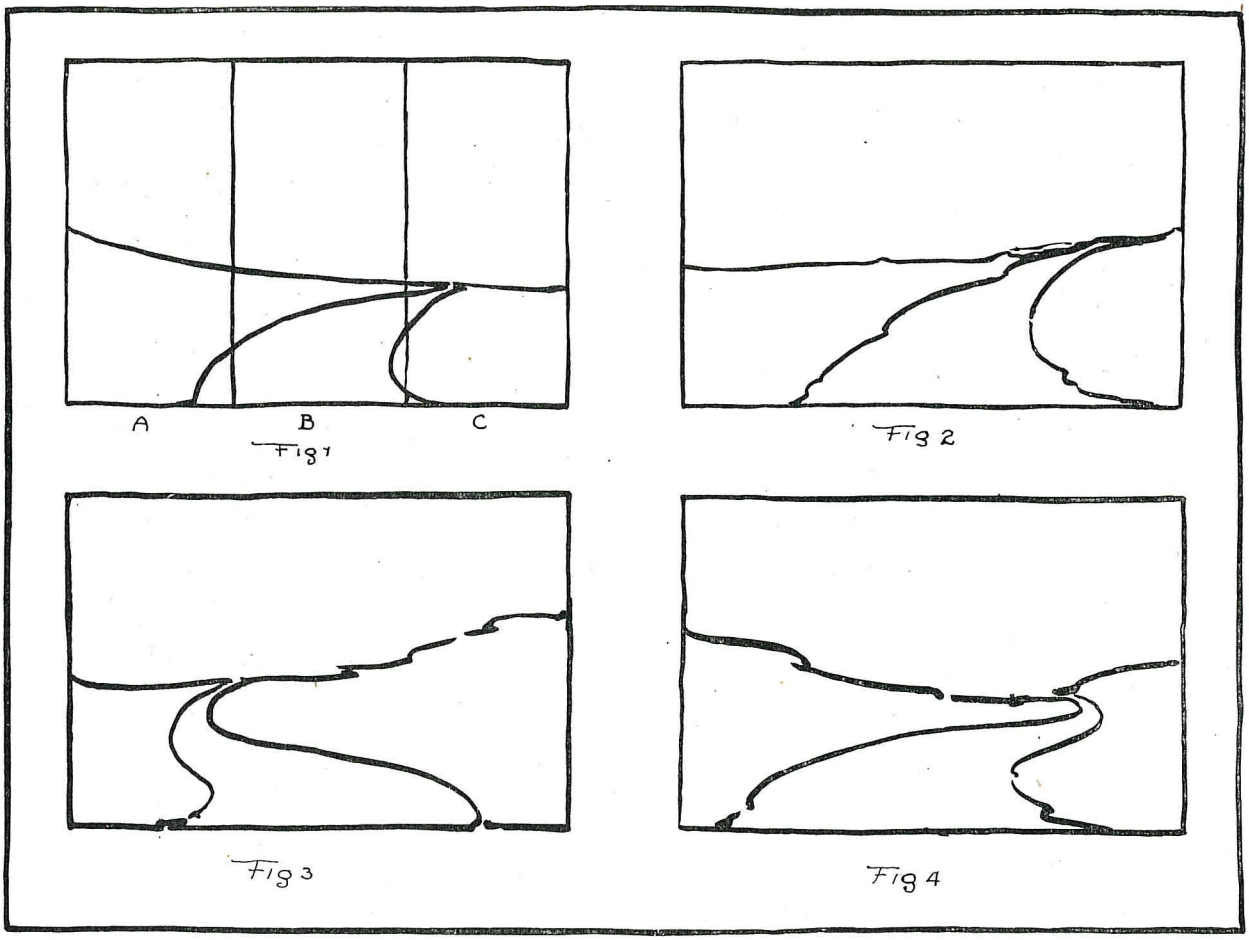


PLATE XXXIV.

The foundation landscape into which trees may be painted, is the same as was developed in the work for first grade. After this foundation, sky, land, etc., has been painted in, the form of the tree should be wiped out with the dry brush. See Figs. 1 and 2, Plate XXXII, for illustration. In doing this work the brush must be cleaned frequently in water and dried with a cloth. When drying with the cloth, care should be taken to use it so as to bring the brush back into good shape. Only a little paint and moisture should be taken from the painted surface at one time and great care should be taken to avoid rubbing so hard as to wear the paper. A few movements of the brush will produce results shown in Fig. 1, Plate XXXIII. Just as soon as the brush gets into the condition illustrated, it is impossible to do

trunk and not allowed to touch the edges, there will be less danger of color spreading.

Taking out the shape of the tree as suggested here gives two very definite helps. In the first place it gives children an opportunity of developing the shape of a tree in a way which they are able to control. In the second place the paper is dried out enough to prevent the color put into the trees from running all over the paper. This method also produces trees soft in outline, lacking in the "pasted on" effect which comes from painting trees over a dry landscape foundation. (See Fig. 3, Plate XXXII, for results of this method in the second grade.)

Several points furthering good composition may be brought into the work of this grade. The grouping of trees, after some practice, at one side or the

PLATE XXXV.

Top Row—Figs. 1 and 2. Bottom Row—Figs. 3 and 4.

other, using a different number of trees at each side. Placing of one hill back of another, and different variations of the sky line will also give definite help in landscape building. Much variety may be introduced into the land space thru the application of different colors. Stretches of field and meadow may be suggested by bringing colors across the paper in irregular ways.

Much work should be done in painting trees, not to be used in landscape. Work for the points suggested for first grade, but expect more from these people who have had greater experience. Paint trees, as they appear in the different seasons. Children are very fond of the brilliant color to be found in Autumn foliage and it suggests a spotting of color, which is somewhat easier of execution than at other times.

In this work of second grade, especially the painting of trees into a moist landscape, do not expect too much from the first few lessons. Keep the end to be attained in your own mind and before the minds of your children and results will come. Above all, have patience and determination.

Grade III.

If children about to enter the third grade have gone thru the experiences suggested in the work for the first two grades, they should have at their command considerable skill in doing simple landscape. If such is the case we are ready to introduce a few more steps, a little bit harder of execution than those previously introduced. Children of third-grade age are able to take directions more easily,

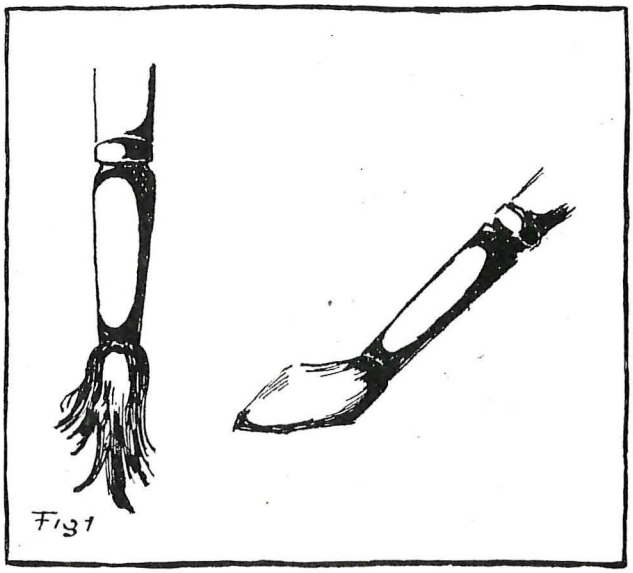


PLATE XXXIII.

think more comprehensively and carry into execution whatever is suggested, with greater skill than are the children previously considered.

It is true of children the world over, that they are anxious for new experiences and new conquests. Put before them interesting, unexplored problems and there will be no standstill in the development of work. If we should fail to do this in our study of landscape, we would find that there would be little change in the children's idea of that subject.

Review as much as seems necessary to recall to the minds of the children the different processes learned in previous grades. Make an effort during this review to eradicate any bad habits of work which may have been retained. The longer these bad habits stay with the children the harder it will be to get rid of them. After a few review lessons children should be able to paint such a picture as is suggested for the second grade in a very few minutes. This rapid work should be encouraged at every opportunity for only rapid work in water color is good work.

In advance we may begin to put more variety into the sky thru cloud effects. In working for these effects wet the surface of the paper very thoroly and drop the color on to this surface, touching the paper with the brush as little as possible. If the brush is simply laid on the paper the wet surface will draw the paint from the brush and float it around to resemble clouds. If the color needs further spreading lift up the edges of the paper until the color runs as much as seems desirable. Sometimes the paper may be taken up from the desk and tilted from side to side to obtain the proper flow of color. Avoid having the colors run too much as this will cause the sky to appear flat and muddy.

Such a process as the one just suggested may be employed in representing the fleecy clouds of summer, the stormy sky, or the effect of wind upon the clouds. Of course, it is necessary to vary the color in working for the different effects. Fig. 4, Plate XXXII, shows the result of this process.

It is not necessary to wait until children have reached the third grade to have them paint sunset skies. Children of the first two grades may paint them with satisfaction. However, third-grade children may be expected to observe more carefully and execute more skilfully than those of the preceding grades. The teacher, herself, should observe very closely and keep in mind color combinations to be found in sunset skies, so that she may have at hand sufficient well founded knowledge to apply. This phase of the work will prove quite fascinating and will give ample returns in attractive results.

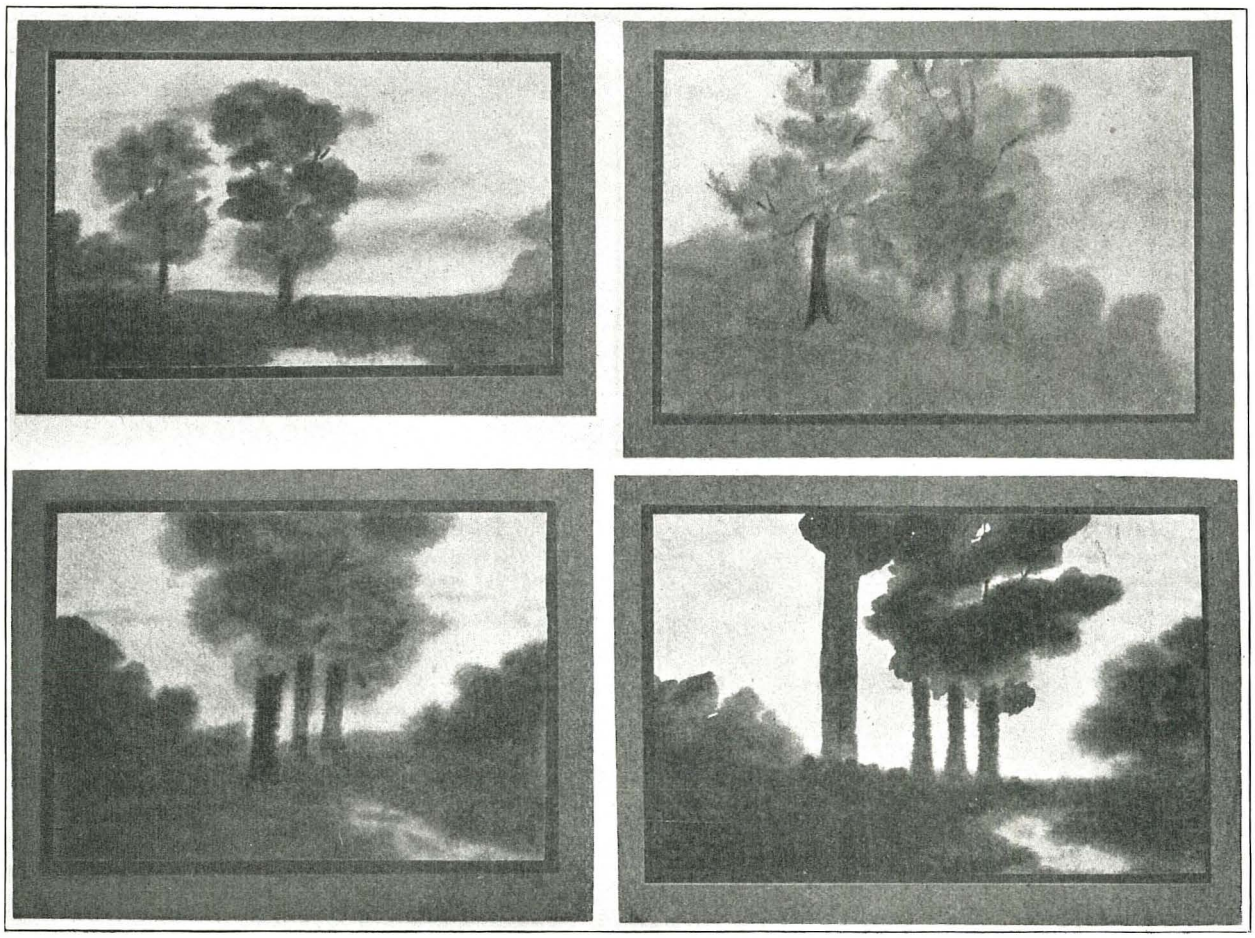


PLATE XXXVI.

The road, which most children seem to think belongs in every landscape, may be introduced to advantage at this time. It cannot be brought in, in a considerable way, however, without getting into perspective. Of course, the children whom we are just now considering are much too young to take up perspective in a technical way. But this fact need not prevent them from putting roads into their landscapes. Thru demonstration and dictating a scheme may be given which will help them materially in keeping the road flat on the ground—and this eliminates all need of work in perspective.

The picture space may be divided into three perpendicular spaces, approximately equal. At first this may be done mechanically, but after a few trials it may be measured off accurately enough with the eye. When this is possible it will not be necessary to use lines dividing the spaces. See Fig. 1, Plate XXXIV. The farthest visible portion of the road is a point and may be located in C near the horizon line. Swing the left-hand side thru C, the right-hand side of B and back into the lower left-hand corner of C. This scheme will bring about the desired result as illustrated in Fig. 2, Plate XXXIV. The road may be drawn from a point in any one of these divisions, but some of it should enter into each one of the three. This scheme is not only instrumental in producing proper drawing, but is also an aid in bringing better size and better composition. Figs. 3 and 4 show variations in placing the road.

Much practice work in pencil, crayon, charcoal, or at the blackboard should be done in order to perfect the drawing which this scheme suggests. This will help greatly in making the work in color easy.

If the road is to be put into a water color landscape the land space may be painted in, and the road wiped out with the dried brush, using the method suggested for wiping out tree spaces in the work for second grade. Following another method the space for the road may be left uncolored when painting in the land and the desired color painted in this space. Narrow lines between the color of the road and the color of the grass on each side will help in keeping them from running together as much as to be damaging. This line should be very inconspicuous, in fact, the effect will be better if it is not a continuous line. Figs. 1 and 2, Plate XXXV, show illustrations for the road development.

The drawing of the stream is similar to that of the road. In color, a water space should be treated much as the sky is colored, because the water catches the reflection of the sky. The narrow, broken line separating the water from the land is very valuable. Do not neglect it. Figs. 3 and 4, Plate XXXV, illustrate the use of streams and other water spaces.

The development suggested in the preceding pages has been worked out with hundreds of children in the first three grades and has proven its worth. It has put third-grade children in a position to do very creditable landscape in water color, and has given them an ability to handle this medium, which will be of value in future work.

It is very possible that local conditions will have considerable effect upon the work. Perhaps it will be found necessary to regrade the different steps. That makes little difference so long as a definite development is kept in mind and adhered to. Perhaps, in some localities, water colors are not used until the third grade is reached. If such is the case start these children at the time suggested for first-grade children.

Do not neglect the opportunity of allowing, nay, even requiring, the children to use the "vocabulary" acquired in expressing themselves and their own planning. This is the end to be attained in all development, and the application of the principles is the correct test of the value of the work.

Plate XXXVI illustrates in color, translation done by sixth-grade children. Note the softness of color thruout. This plate is an indication of what our color teaching should lead to.

ARTISTIC TABLE DECORATION

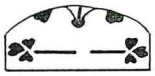
Edith Phelps and Mabel Arbuckle, South Bend, Ind.

ABILITY to make the commonplace things of utility beautiful is far-reaching in its effect on the health and happiness of the family. It is also a good business asset as is demonstrated by the artistic service in our best restaurants, clubs, hotels, tea rooms and other public places of high-class service and correspondingly high prices.

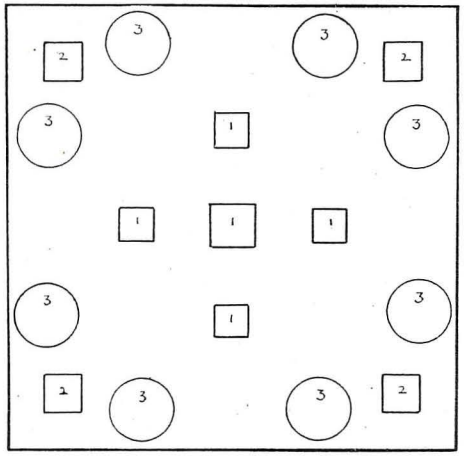
Good digestion waits upon Appetite, and Appetite, in turn, upon Artistic Service. It is therefore established that a successful appeal may be made to a flagging appetite by the artistic arrangement of even the most commonplace dish. Let us apply these principles to the development of the requisite appointments for a luncheon to be given on St. Patrick's Day.

The date having been selected the invitations are to be designed and issued. These may be more or less informal in keeping with the spirit of the day. "We ask you to come to our luncheon, where we will greet you most hearty and gay, and let each wear a little green Shamrock, to celebrate St. Patrick's Day." "In honor of good old St. Patrick whose memory we will ever keep green, we ask you to lunch on March 17." These or other jingles with appropriate motifs may be used. Emblems of Ireland, as the

Top view of individual cake



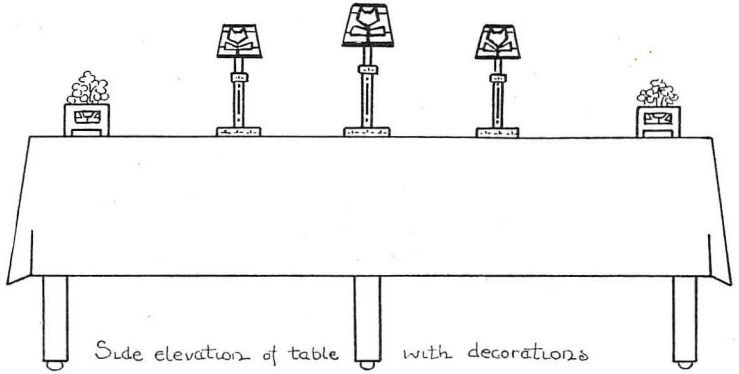
Side view of cake



Top view of table

Ripe olive turtle.

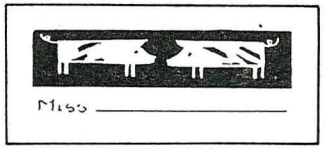
1 Candle-stick
2 Flower Pot
3 Plate

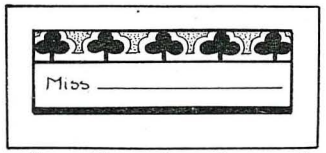


Side elevation of table with decorations

Individual service arrangement

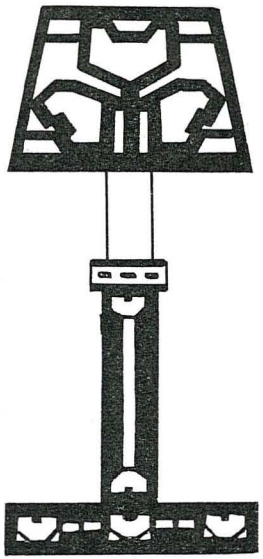
Design for invitation



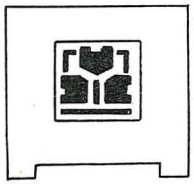


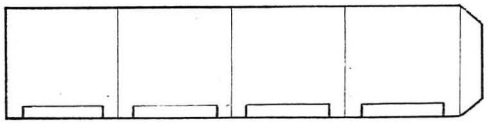
Suggestions for place cards

A place card which stands

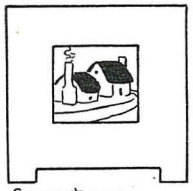


Candle stick and candle shade

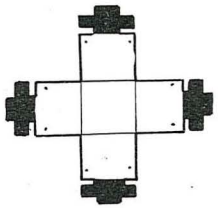




Pattern showing sides of flower pot.



Suggestions for design on Flower Pot.



Case for nuts

Shamrock Favor

DESIGNED BY THE MISSES EDITH PHELPS AND MABLE ARBUCKLE.

flag, the harp, shamrocks, Irish wag, etc., are all good treated decoratively.

The following simple menu is suggested as appropriate to the day and capable of artistic adaptation.

Menu.

Irish Potato Bisque
Ripe Olive Turtles. Nuts
Lamb Chops. Mint Jelly
Potato Balls rolled in Parsley
Cream Peas in Timbales
Hot Rolls. Green Gooseberry Preserves
Head Lettuce Salad. Roquefort Dressing
Wafers
Pistachio Ice Cream. Cake
Coffee. Mint Creams.

In the first course the ripe olive turtles are made by inserting cloves for head, tail and feet; a slice should be cut off on the under side. The cases for nuts are made of green construction paper, according to the illustration, and tied with small green silk cord. In the second course the lamb chops should have a green tissue paper collar fringed on one side and fastened around end of chop bone. The mint jelly should be molded, sliced to desired thickness and cut in the form of shamrock. The timbales should be made over the shamrock molds.

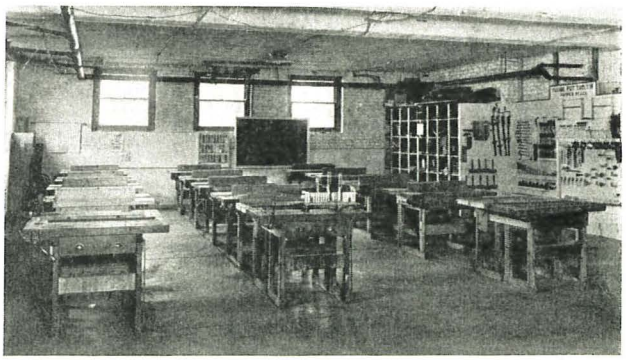
In the third course the head lettuce salad should have an Irish flag upright in the center.

In the fourth course the Pistachio ice cream should be tinted light green and molded in individual forms of Irish hats. In the side of the hat insert the shamrock favor. The shamrock is cut from green paper. The Irish face is designed on white paper with green paint. Paste face to shamrock, insert head of long pin between the two designs and paste securely. The individual cakes are iced in white with design of shamrock cut out of green citron and applied while frosting is still soft. The mint creams are tinted light green. The lighting of a dining room should be most carefully considered. Never use a direct dome light over dining table. The glare is most uncomfortable on the expanse of white cloth and gleaming dishes and most unbecoming to guests. Side lights are desirable with shaded candles on dining table. A square table should be used as it is structurally in design with the room. Should it not accommodate the desired number of guests it may be enlarged to rectangular form.

In table decoration the design should be kept very simple. Do not use elaborate lace and embroidered center pieces. Keep all as chaste and simple as possible. Candlesticks may easily be turned out in the manual training department according to the illustrations given. These are to be painted with green enamel paint and a design of shamrock executed in white enamel paint. Shades are four-sided, to correspond with the shape of candlestick and made of green construction paper. Use shamrock motif in bisymmetric design and line with white tissue paper. Boxes filled with shamrock are placed at the four corners of the table. These are cut from chip board or heavy cardboard, according to the diagram given. Cut on the heavy lines and score on the light lines. Bend box into shape and attach flap to inside with paste. Cut a square or cardboard for the bottom. Bend narrow rectangles, between legs of box, to inside and attach to bottom square with paste. Paint with green enamel paint and apply design to four sides with white paint. Line inside with tinfoil and partly fill with sand in which may be planted the shamrock. Design place cards of white water color paper and execute in green paint. Decorative designs may be used of Irish wag, thatched cottages, Irish donkey and cart, shamrock, flag and many other motifs which will suggest themselves as in sympathy with the occasion.

The social instinct is highly developed at a very early age, and nothing gives a child more joy than a party. In the higher grades this problem may be correlated with the domestic science department with the added value of the execution of the menu. That all meals should be artistically served as well as carefully prepared is not yet given the consideration which it deserves in public school education. This opens up a wide field for the practical application of design and color which may develop into lucrative employment for the energetic student. The demand for artistic table appointments is larger and the commercial supply very poor in design, exceedingly commonplace and limited in amount.

AFTER THE FIRE.



SHOP AS REINSTATED BY TEACHER AND STUDENTS.

Manual Training Shop at Wilmette, Ill., after its destruction by fire. At the right: the shop rehabilitated in a neighboring school basement.
Mr. L. J. Mitten, Teacher.

PRIMARY CONSTRUCTION

Edward F. Worst, Director of Elementary Manual Training and Construction Work, Chicago

MARCH.

Construction Work for First Grade.

While March is still one of the cold months of the year there is something about the name that suggests spring. Lovers of flowers begin to talk about their gardens and the kinds of seeds best suited to the soil and climate of their immediate section of the country. The birds begin to arrive from the South, which adds to the interest of the coming spring.

Cutting.

Trees with and without leaves, garden implements, rake, shovel, spade, hoe. Cutting of fences, birds, bird-house. Early wild or cultivated flowers for flower pot modeled in clay.

Clay.

Modeling of animals, horse, cow, pigs, flower pot.

Pin Wheel.

The March winds suggest the pin wheel. Children by this time are learning the directions.

Purpose:

To interest the children in weather vanes in order to determine directions of wind.

To aid in teaching cardinal points.

To begin to teach pupils to observe and to draw conclusions concerning their observations.

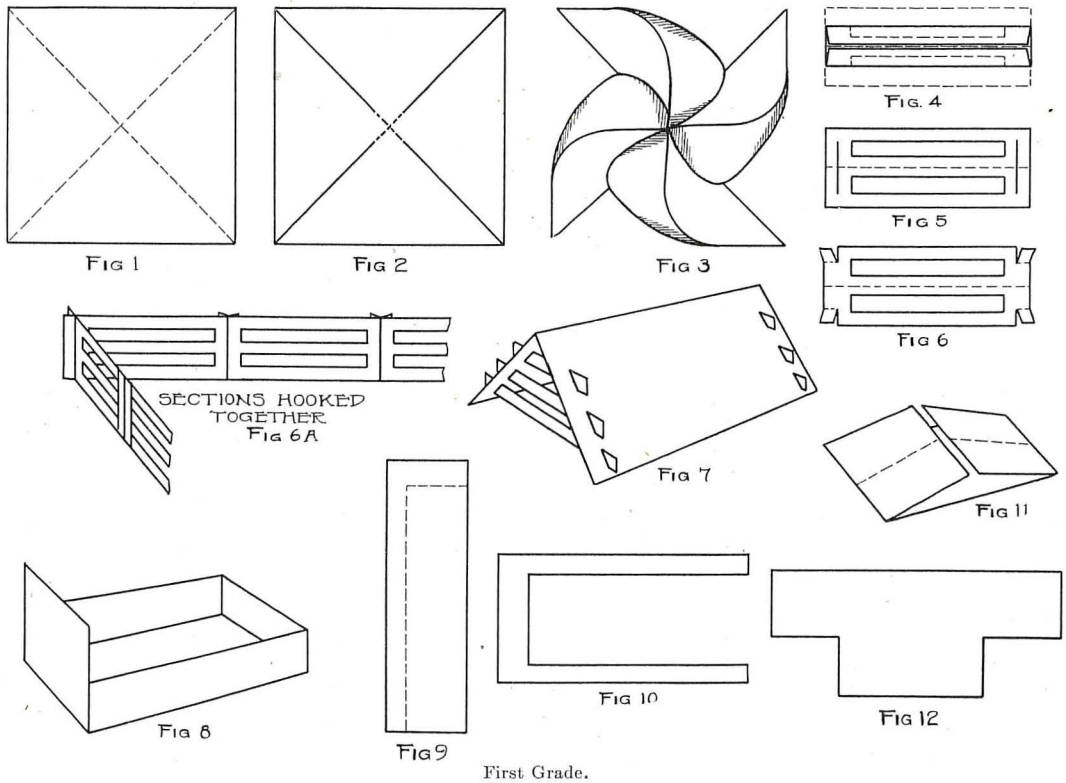
To create an interest in other weather vanes.

Material:

One 6″ square of manila drawing paper or tinted construction paper, cut by the advanced pupils. Beginners are to be furnished with the squares.

One package of ordinary pins.

One piece of No. 6 reed, about 7″ long, or a colored stick.



First Grade.

Presentation:

Up to this time the pupils have cut 9″ squares by measuring along the edges of a 9″x12″ sheet of paper. In the construction of the pin wheel, he draws a 6″ square. This may best be done by passing to each pupil a 6″x9″ piece of paper, measuring 6″ along the 9″ edges, and connecting the dots by a straight line.

Draw or fold diagonals of square as shown in Fig. 1. Along each diagonal and about one-half inch from center, place dotted lines. Fig. 2.

Cut along diagonals until the dotted line is reached. Turn every other point to the center, and hold in place with pin, as shown in Fig. 3. The point of the pin is forced into the end of the reed, or stick, which is very porous, thus permitting the pin to enter without resistance.

To make the pin wheel spin, point directly outward and run, or hold upward and blow.

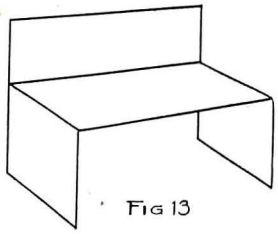


Fig 13

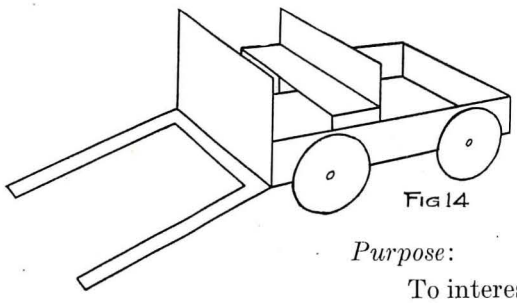


Fig 14

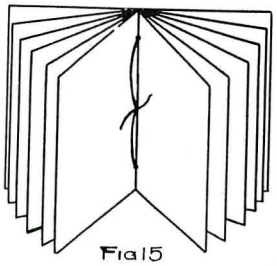


Fig 15

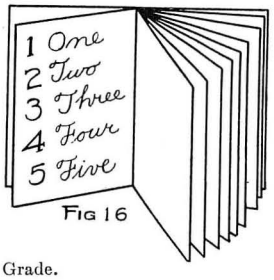


Fig 16

First Grade.

Group Problems—The Farm.

One of the most interesting group problems for this season of the year is the "farm." Cut the trees and construct the house, barns, corn cribs, chicken coops, etc., as suggested in previous outlines. All building construction may be based on the construction of the house.

To Make the Fences.

Pass to the pupils rectangular pieces of paper $1\frac{1}{2}''$x3″. Fold in halves lengthwise, unfold. Fold each long edge to center crease. While folded cut a long narrow strip as indicated by dotted lines in Fig. 4. When unfolded the cutting looks like Fig. 5.

Fold into halves again and cut slits as shown at the ends of Fig. 5.

Cut another section of the fence as in Fig. 4. Instead of cutting slits from the folded edge, cut from the open edge toward center, as indicated in Fig. 6. Fold the small flaps so they may be slipped thru the slit. When thru unfold the flaps as shown in Fig. 6A. Construct other sections until enough has been made to enclose the various fields.

Other Exercises Without Paste.

Many other exercises, such as chairs, garden table, settees for the lawn, small coops for the chickens, trough for the pigs, etc., may be made by slitting the paper as above suggested.

Colored sawdust may be used in various ways to indicate fields of growing grass, and various grains. Even flower beds may be made of the brighter colors.

Sawdust may be colored by placing the dye in water. When thoroly dissolved the sawdust may be put into the water and allowed to stand for several hours. When removed it may be spread on heavy paper to dry.

Chicken Coop.

Pass to each pupil a rectangular piece of paper 8″x4″. Advanced first-grade pupils should measure and cut the rectangle.

Fold into halves by folding the short edges together; cut slits in sides about one-half inch from open edges. Thru these slits pass strips anywhere from $\frac{1}{4}''$ to $\frac{1}{2}''$ wide. See Fig. 7.

Purpose: *Wagon.*

To interest the pupils in cleanup day and gardening. To create a desire to make something for a younger brother or sister. To encourage incidental number work.

Material:

1 pk. (50 sheets) of tinted construction paper 9″x12″.

Small wooden collar buttons.

Presentation:

In order that the pupils may work intelligently, it is necessary that they should know what they are going to construct. I should, therefore, recommend that the teacher, in order that she may understand its construction and make it possible for her to ask the pupils intelligent questions leading to the construction of the wagon, construct one herself, and present it to the class. Have them name the parts of the wagon—the box, seat, dashboard, thills, axle, wheel, hub, etc.

What part of the wagon looks like anything constructed in previous lessons?

If necessary take the wagon apart to show that it is the same in construction as the boxes folded for various lines of seat work.

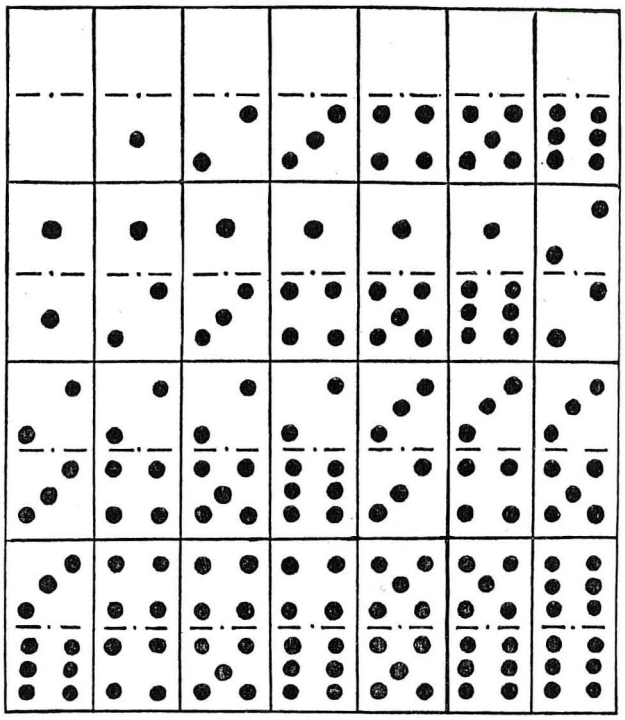


Fig. 17. First Grade.

To Make the Wagon.

Measure off 9″ on the long edges of the 9″x12″ piece of construction paper. Connect dots by a straight line. Cut along line just drawn. The piece cut away may be reserved for the wheels of wagon.

Proceed to construct the wagon box of the 9″ square in the same way as other boxes were constructed, with double sides and ends.

If necessary review the number while folding, as suggested in previous exercises.

The dashboard is made by allowing the square at one end to paste to one end of the box, as shown in Fig. 8.

The thills and seat are made of the row of squares cut away. Cut the strip of four squares into two parts, so there are two squares in each. To make the thills, fold one of the above pieces so the long edges come together, and cut as indicated by dotted lines in Fig. 9. When unfolded it looks like Fig. 10. The thills are now pasted to the box as shown in Fig. 14.

The wagon seat is made of the remaining piece of two squares. Fold the two short edges in to center crease, as shown in Fig. 11. Cut as indicated by dotted lines. Fig. 11. When cut, the seat looks like Fig. 12. Fold as shown in Fig. 13.

In cutting the wheels, use a pattern. The paper tops used as stoppers in milk bottles make very good patterns. Fig. 14 shows the completed wagon.

Number Based on the Construction of Wagon.

How long is one edge of the square? (Nine inches.)

How long are two edges of the square? Three? Four edges? Count by nines to 27; to 36.

Two edges together are what part of the distance around the square?

If 18 inches is one-half the distance around the square, how many inches around the entire square?

After the paper is folded into 16 squares, how many squares in 1 row; 2 rows; 3 rows; 4 rows?

Count by fours to 12; to 16.

How many squares in half the paper?

If the number, in connection with the construction of the various exercises, has been developed each time, the pupils should by this time recognize the fact that 1-2, 2-4, 4-8, and 8-16 are the same.

After cutting away one row of four squares, how many squares remain?

Holding the paper by the long edges, how many squares are there in one row? How many in two rows; in three; in four?

Count by threes to 12.

Number Book.

Material:

4 sheets manila drawing paper 9″x12″.

1 sheet tinted construction paper 9″x12″.

1 No. 12 or No. 14 darning needle.

Carpet warp.

Purpose:

To give the pupils an idea of simple book construction.

To aid the pupils in keeping systematically a few number facts.

Presentation:

Pass to each pupil four sheets of 9″x12″ manila drawing paper, and one sheet of 9″x12″ tinted construction paper. Put the short edges of each sheet together and crease thru the middle with the handle of scissors, as suggested in previous exercises. When all are creased, open the sheets and place them one upon another, putting the colored sheet on the outside.

Tie the book with a piece of carpet warp. This may be done by threading the darning needle, forcing it from the inside thru the leaves on the crease, to the outside of book. Taking a long stitch, say about three inches, force the needle back to the inside again. Tie on the inside of book with a hard knot. Fig. 15.

Hektograph or cut figures from an old calendar. Paste the figures from one to ten in the book, as shown in Fig. 16. As new figures are learned paste them in the book. After each figure or Roman numeral, write the name.

Dominoes.

In many school systems pupils are admitted to the first grade twice a year. In such a case it becomes necessary to plan work for the beginners. The dominoes adapt themselves very nicely not only to beginners but also to the advanced first grades.

Box for Dominoes.

Pass to each pupil a 6″ square of tinted construction paper. Fold into sixteen small squares. For remainder of construction see direction given for box for the pegs, September outline.

Cover for Box.

Pass to each pupil a $6\frac{1}{8}$″ square of tinted construction paper.

Proceed to construct cover the same as box.

How to Use the Dominoes.

For a beginning class each domino may be cut in two, showing only one group and not the combination.

1. These may be matched, laying all the ones together; all the twos, threes, etc.

2. They may be laid so as to count from one to six.

3. With an older class, it is better to use the dominoes without cutting in two.

Select one domino and lay it in the center of the desk. Find other dominoes that will match either end and lay those. Match the spots on the ends and work as in the regular domino game until all the dominoes are used. Follow with a recitation

in naming the combinations shown in the arrangement. This will give drill in multiplying by two.

4. Lay with all the blanks in a horizontal row and with ones at the top, letting the lower row count from one to six. The third row will have the twos at the top with the lower row counting from two to six.

The fourth row will have threes at the top, with the lower row counting from three to six.

The fifth row will have fours at the top, and four to six on the lower row.

The sixth row will have fives at the top, and five and six at the bottom.

Follow this with a recitation, having the children count one to six.

5. All the combinations of numbers to twelve are found on the dominoes. Write the combinations on the board and have the children arrange dominoes in order.

0	0	1	1	0	2	3	0	2	4	0	3	4
1	2	1	2	4	2	1	5	3	1	6	3	2
1	2	2	3	4	4	4	5	5	5	6	6	6
5	1	4	5	4	5	6	5	6	5	6	6	6
1	6	3	2	4	3	2	4	3	5	4	5	6
6	7	7	7	8	8	8	9	9	10	10	11	12

6. Lay so as to have only the six show. Lay double six, then slip half of each other domino that shows six under the double.

Begin with double five and lay so as to show the seven fives remaining.

Lay double four and slip under it the blank one, two, three, so as to show the six fours.

Lay double three and slip under it the blank one and two, so as to show five threes.

Lay double two and slip under the blank and one, leaving four twos.

Lay so as to show three ones.

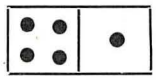
Double blank is the only domino left.

Follow this with lesson on counting spots shown, counting by ones, twos, threes, etc.

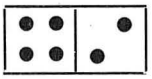
7. Lay so as to show a vertical row of ones by starting with double one and slipping under the number shown on the domino with each of the other ones. Make rows showing the twos, threes, fours, fives, and sixes.

8. Lay so as to make the dominoes count 1, 2, 3, 4, 5, 6 in vertical rows. This can be done by covering up part of some of the dominoes.

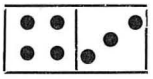
9. The following is an interesting way to use the cards. Have the pupils use the domino as a pattern, as suggested in Ex. 10. Place dots instead of figures, and beneath each have the pupils write the combinations and differences:



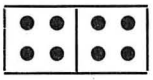
4 and 1 are–
1 and 4 are–
5 less 4 is–
5 less 1 is–



4 and 2 are–
2 and 4 are–
6 less 4 is–
6 less 2 is–



4 and 3 are–
3 and 4 are–
7 less 4 is–
7 less 3 is–



4 and 4 are–
2 fours are–
8 less 4 is–

10. Use the domino as a pattern for drawing a rectangle. Lay domino across the end of the rectangle and draw line dividing rectangle into 2 squares. Write figures in each square to correspond with number of dots on each domino.

11. Use domino as a pattern for drawing rectangle and write in it the figures showing combination and sum of dots on each domino or write combinations without rectangle. These may be written in two ways:

$$\begin{array}{r} 6 \\ 4 \\ \hline 10 \end{array} \qquad 4+6=10.$$

After the children have learned to make figures, let them write the combinations in both ways.

1	2	2	3	3	6	1+2=3	2+2=4	3+2=5
1	1	2	1	2	1	1+1=2	3+1=4	4+1=5
2	3	4	4	5	7			

MARCH.

Construction Work for Second Grade.

Window Boxes for Doll House.

The interest in the doll house has not as yet died out. The window boxes make a very interesting problem.

Purpose:

To arouse interest in the windows at home.

To aid in reading a pattern drawing.

To encourage simple mechanical drawing and mathematics.

Material:

Tinted construction paper.

Presentation:

A general talk on beautifying the home should precede the construction of window boxes for the doll house.

Place on the blackboard a pattern drawing for a window box when finished, that shall be 5″x1″x$\frac{1}{2}$″. Fig. 1.

The sides and ends are planned so that the box is one inch deep when the paper is left single. Fold the edges of the ends and sides inward to crease, making the box one-half inch deep.

Artificial Flowers.

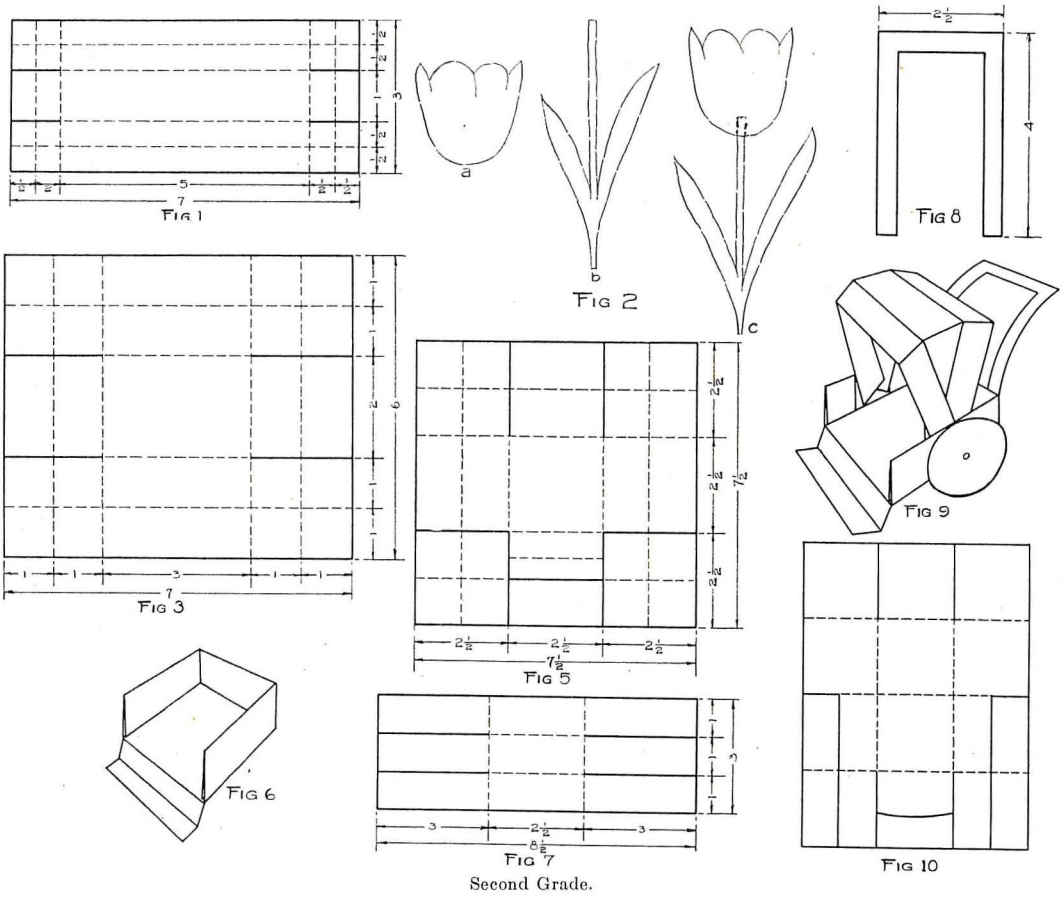
Most attractive flowers may be cut free hand from scraps of colored paper as shown in Fig. 2.

The flower may be cut first as shown at "a," Fig. 2. Next cut the stem and leaves as shown, "b," Fig. 2. The flower may now be pasted to the

stem by allowing the stem to paste to the under side of the flower as shown at "c," Fig. 2. A number of flowers are cut in this way and pasted to the bottom of the box by folding over about $\frac{1}{4}''$ of the stem.

Spelling Book.

In addition to the box for initial blends which is a problem directly related to the schoolroom administration the spelling book should be constructed. This makes a most interesting monthly problem, as all communities are interested in spelling. Children should be encouraged to keep their spelling books for the year.



Second Grade.

No space will be devoted to a description of the spelling book, as its construction is the same as previously described.

Box for Initial Blends (Work in English).

The pupils have already constructed numerous boxes of various colors and sizes.

Allow the pupils to have the game of "Initial Blends."

Discuss with them the advisability of constructing some sort of a receptacle to hold the various parts of the game.

Purpose:

To provide a way for the pupils to aid in caring for materials used in the schoolroom.

To provide concrete number work.

Material:

Tinted construction paper.

Library paste.

Presentation:

Get the pupils to decide which would be better—a box or an envelope. If it is thought best to use a box, how long should such a box be? How wide? How deep? What kind of paper would be good? Why?

A box 3 inches long and 2 inches wide and 1 inch deep would be large enough. Try to keep the dimensions of the box in whole inches.

If the box is to be 3 inches long, 2 inches wide, and 1 inch deep, when finished, how large must the piece of paper be to make the box if the sides and ends are made double.

If the teacher will draw on the board a rectangle 3"x2" and then add the sides and ends while developing the dimensions, a foundation is being laid to teach the pupils to think and act intelligently. Fig. 3 shows the drawing for the cover of the box. It will be remembered that all dotted lines are to be folded and all continuous lines cut.

To Make the Box:

Cut a second rectangle the same as the one used for the cover. Since second-grade pupils cannot measure in small fractional parts cut freehand a narrow strip between $\frac{1}{8}''$ and $\frac{1}{4}''$ wide from one long edge

and one short edge. Proceed with all other measurements the same as when making the cover. The narrow strip cut away will cause the box to be a trifle smaller than the cover.

The Game.

Fig. 4 shows the game as it comes from the print shop.

To separate the large sheets into the various parts cut on all continuous lines. By so doing the initial letters are found on the various squares folded by dotted lines which indicate the number of endings which may be found in the box.

Care should be taken to not have the pupil spend his time looking for the endings of only one initial blend. Have him place a number of the squares on which the initial blends are found on the desk, and every time he picks up an ending place, place it in its proper place on the square to which it belongs. By so doing every time he picks up an ending there is a place for it and we get away from the great amount of time wasted by looking for just one particular ending.

Go Cart.

This is a problem in which most children can be interested. It follows the play idea, a phase of the work which we cannot afford to slight. Thru this play interest most valuable lessons may be derived along academic lines.

To Make the Cart:

Draw and cut a seven and one-half inch square of tinted construction paper. On the edges place dots two and one-half inches apart. Connect the corresponding dots by straight lines. Cut on continuous lines and fold on dotted lines as shown in Fig. 5. When folded this makes the box part of the cart as shown in Fig. 6.

To Make the Hood:

Draw a rectangle 3″x8½″. On the short edges place dots one inch apart and connect corresponding dots by straight lines. On the long edges place dots 3″ from short edges and connect corresponding dots by straight lines as shown in Fig. 7. When folded it looks like hood shown in Fig. 9.

The Wheels:

To make the wheels use a pattern similar to the circular pieces of paper used in the tops of milk bottles.

The Handle:

Fig. 8 shows drawing of handle; one inch of "A" and "B," Fig. 8, are pasted to the back of box part.

The parts are assembled and held together by using the small black collar buttons. Fig. 9 shows finished cart.

Fig. 10 shows another way for making the box part of the go-cart. A box of this kind requires four wheels instead of two as shown in Fig. 9.

MARCH.

Construction Work for Third Grade.

Cutting and Tearing.

March is the month of winds. Make cuttings and tearings to illustrate the blowing wind.

An occasional crocus or snowdrop makes its appearance and very often the more adventurous robins make their return from the South. All these are good suggestions for cutting.

A most interesting plan for the first three grades is to set aside a portion of the blackboard or a large sheet of manila paper might be used. On this mount your drawings and cuttings that suggest signs of spring.

bl	ack ow ew	dw	indle ell arf	pl	ay ant ow	sn	ow are ake	tr	y eat ouble
br	own eeze ought	fl	ower ame ow	pr	int oud ay	sp	are un eak	tw	ine ice it
cl	oud ay ear	fr	iend ost ee	sc	atter amp are	spr	ing out ay	ch	air eck in
cr	ow awl umb	gl	ad ow ee	sl	ow eep umber	st	ar ay eal	sh	ow ine eet
dr	aw ive own	gr	ay ound ow	sm	oke all ile	sw	eep ing ift	th	at em ink

Fig. 4. Second Grade.

Marble or Jackstone Bag.

This problem may be so planned that the boys may use the bag for marbles and the girls may use it for jackstones.

Purpose:

To give the pupils a review in measuring in whole, half, and quarter inches.

To make the number work practical.

To encourage neatness and accuracy.

Material:

One piece of cardboard $3\frac{1}{2}''$x5''. These boards may be cut from strawboard boxes brought in by the pupils.

Carpet warp and butcher's twine. The bag may be made of all carpet warp, using it for both warp and woof; or carpet warp may be used for the warp and butcher's twine for the woof.

Darning needle No. 12.

No. 8 Harper packing needle. If the Harper needle cannot be secured use the darning needle for weaving. Small wooden needles may be made by the boys.

Presentation:

As this is the season for jackstones and marbles it will take but little effort on the part of the teacher to enthuse the pupils.

To Thread the Loom:

On the cardboard $3\frac{1}{2}''$x5'' draw lines $\frac{1}{4}''$ from each end. Fig. 1. On these lines place dots $\frac{1}{4}''$ apart. Fig. 1.

Divide the first and last quarter-inch on each line into halves. Fig. 1.

With the darning needle, puncture the cardboard at each dot. Number the holes as shown in Fig. 1.

Force the darning needle down thru hole No. 1, leaving an end as in Fig. 1. Bring the needle up thru hole No. 2 and back to No. 1. With the first end, and the thread in the needle, tie a hard knot and force the needle thru hole No. 3, down and up thru No. 4, back and down No. 3, a second time; up thru 5, down thru 6, back thru No. 5 a second time, down No. 7, up thru No. 8 and down No. 7 a second time, up thru No. 9, down thru No. 10; and so on until the loom is threaded. Fig. 2.

It will be observed that at one end there is no passing from one hole to the other on the horizontal line. The end forms the bottom of the bag and is closed when taken from the loom. The other end is the top, and is open.

Begin to weave at the bottom, using either carpet warp or candle wicking.

To Make Drawstrings:

When the weaving is finished to about $\frac{3}{4}''$ from the top, begin with a new thread. Begin to weave by leaving a long end to the right. Fig. 3. Weave around once and cut the thread, leaving another long end to the right. Fig. 3.

With the thread cut, begin to weave at opposite side of loom by leaving a long end to the left. Weave around once and leave another long end to the left. Fig. 3. Finish the weaving, as in the beginning, weaving as closely to the top as possible.

If it is so desired, the drawstrings may be woven in right next to the top. The little heading given by weaving the drawstrings $\frac{3}{4}''$ from the top adds a little to the appearance of the bag.

Number Growing Out of the Marble Bag.

What is the length of the two short edges of the loom together?

What is the length of one long edge and one short edge together?

What is the perimeter of the loom?

What is the length of each warp thread? How long a thread must I have to thread up and down five times, four times, six times, etc.?

Following the above suggestions make as many examples as possible.

Word Book.

Purpose:

To keep alphabetically the words relating to the English growing out of the story telling.

To give an opportunity for simple book construction.

To teach neatness and accuracy and an appreciation for labor.

Material:

2 pieces of jute board $4\frac{1}{2}''$x6''.
2 pieces of marble paper.
1 piece of bookbinders' cloth 6''x2''.
1 piece of super 5''x$1\frac{1}{2}''$.
2 sheets of white paper $12\frac{1}{2}''$x$19\frac{1}{2}''$.

Presentation:

Pupils of the third grade have reached the place in their academic work when considerable independent writing is expected. To insure correct spelling without taking the teacher's time the little word book is constructed. It is made in such a way that the words may be arranged alphabetically on certain pages. To do this so the pupils may work as economically as possible, the pages will be indexed so that any word beginning with a certain letter may be found by turning at once to the page on which all words beginning with that particular letter are written.

To Construct the Book:

First—Cut the bookbinders' cloth into strips $6\frac{1}{2}''$x$2\frac{1}{2}''$. The required size is 6''x2''. By cutting the strips $6\frac{1}{2}''$x$2\frac{1}{2}''$ will give the pupils an opportunity to do their own measuring and cutting to 6''x2''.

Second—Draw a line lengthwise down center of strip just cut. Fig. 4. Draw other lines $\frac{1}{4}''$ from line just drawn, Fig. 5. Apply paste to entire strip and place jute board covers on strip as indicated in

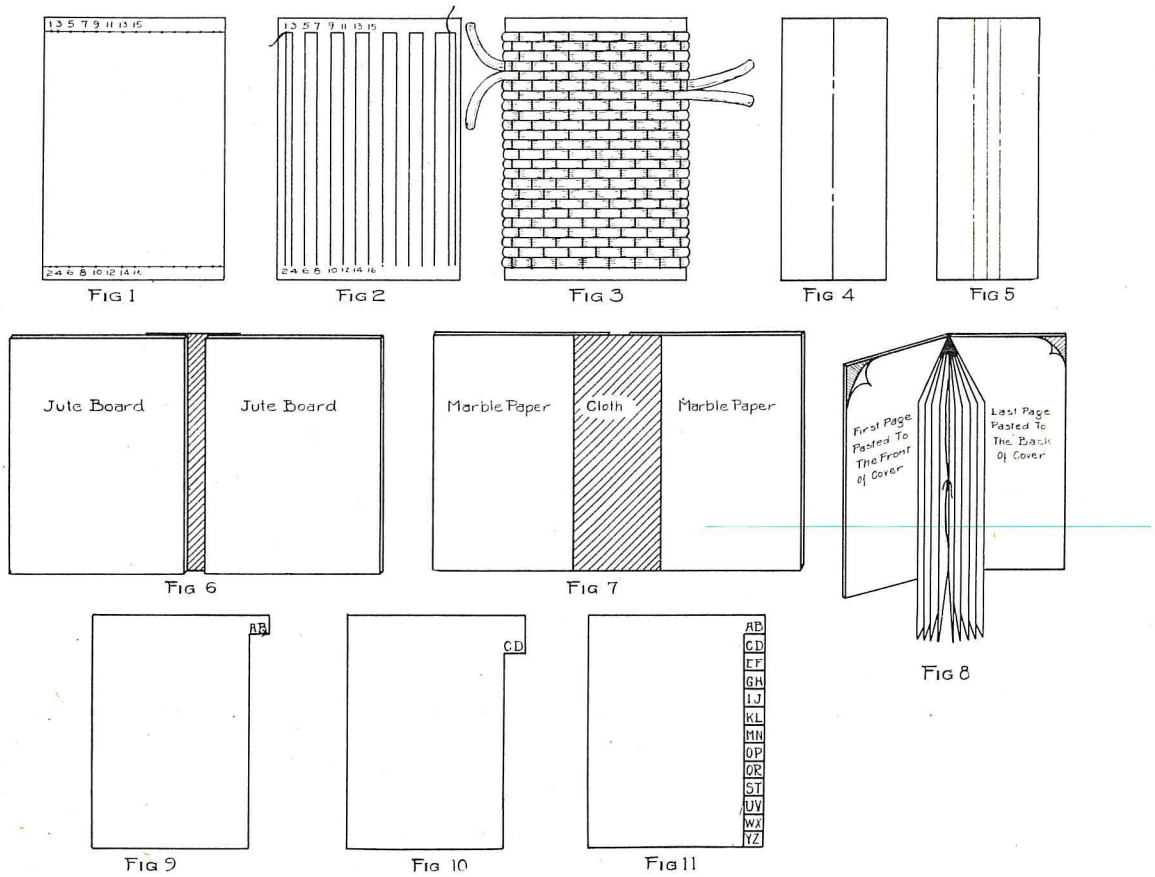


FIG 1 FIG 2 FIG 3 FIG 4 FIG 5

FIG 6 FIG 7 FIG 8

FIG 9 FIG 10 FIG 11

Third Grade.

Fig. 6. This leaves a strip $\frac{1}{2}''$ between the covers, Fig. 6. It will be observed that bookbinders' cloth is the same length as the jute board covers. The covers should now be placed in the press.

Third—Each pupil is given two sheets of white paper which are folded in the following way:

Fold the two short edges together.

Fold again what are now the short edges together.

Fold again the third time the short edges together.

Fourth—Place the two folded white sheets one within the other. Paste a strip of super one inch by five inches down the back of the outside folded sheet. When this is done tie the sheets together the same as in the spelling blank book. Do the stitching so the knot comes on the inside.

Fifth—Take the covers from the press. Cut the marble paper so it will cover that part of the jute board not covered by the bookbinders' cloth. The marble paper is cut large enough so that one edge will overlap the bookbinders' cloth about $\frac{1}{8}$ of an inch, Fig. 7.

Sixth—The tied sheets of white paper are now placed into the covers. Paste is applied to the first page of the book and the cover is pressed down on it. This makes the first page become the lining of one cover. Do not allow the pupils to open the book wide while the paste is wet. Open only enough to smooth the lining. Before applying the paste slip a piece of newspaper under the first sheet. This separates it from the other pages and prevents the paste from getting on the edges of the under pages.

The last page of the book becomes the lining for the other cover. Proceed the same as in the first lining. Fig. 8 shows the pages placed inside the covers and the first and last pages pasted to them.

Seventh—To index the pages pass to each pupil a strip of bogus Bristol board $6''x\frac{1}{2}''$. This may be had by going to the second-grade teacher as the strips were used in the secod grade for basket weaving. From the length of this 6-inch strip cut away $\frac{1}{4}''$. Place the strip along the outer edge of the first page of the book, so the lower edge just meets the lower edge of the page and with the pencil draw along the left edge and upper end of the strip. Cut on the lines just drawn. This leaves a quarter-inch projection at the top of the first page. On this the letters "a" and "b" are placed, Fig. 9.

From the strip cut away another quarter inch and place the strip on the second page and draw around. Cut on lines just drawn. This leaves a projection on the second page again as large as that of the first page. On this place the letters "c" and "d", so they come just beneath the "a" and "b" on the first page, Fig. 10.

From the strip cut another quarter-inch and place on the third page. Proceed to draw and cut as in others.

Continue in this way until each page is indexed, as shown in Fig. 11.

INDUSTRIAL-ARTS MAGAZINE

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EDITORIAL

THE INDIVIDUAL VERSUS THE ORGANIZATION.

With emphasis on efficiency and conservation sounding in our ears as it has during the past few years, comes the reflection that no leading country of the world has less individual efficiency, more waste of valuable time, talents and property, and more organizations to avoid these evils than our own United States. With this condition comes the conclusion that our organizations must be ineffective.

The purpose of organization is the co-operation of individuals to promote and effect some definite purpose. Too many organizations refute the very purpose for which organizations are promoted. The capable American citizen does not find days in the week or months in the year sufficient to give more than casual attention to the organizations of worthy purpose that claim his support. The earnest individual is tempted to an interest in too many organized efforts.

One fundamental reason for the multiplicity of organizations lies in our mania for leadership. Pupils in our schools are led to the conception that unless they have official connection with one or more organizations they are of most common ability. Herein lies a valuable lesson which should be given thru school instruction. Executive ambition is at present overabundant and misdirected. Individual accomplishment is never over abundant. As teachers we have recognized and complimented the ability to lead others, and have not given adequate encouragement to personal, individual accomplishment.

True Democracy exalts the individual who serves the commonwealth by personal service. The blind hero worship of history has passed, and in its place we must teach the individual to be effective in his chosen line of work. We must teach the doing of common things uncommonly well.

DEFINITE DEFINITIONS.

THE "nomenclature of the Industrial Arts" is in the hands of at least three committees of prominent organizations for consideration. There is a valuable service for these committees to perform. This service will find its greatest application in presenting with authority the meaning of words for use by industrial art workers.

We do not doubt that these committees will so carefully consider these words as to warrant their general acceptance. We hope for agreement between the committees, for without unanimous consent of authority the purpose of the committees will be refuted. Authority on the meaning of words is necessarily unanimous to be acceptable. We hope also that the words will be given definite meaning. If differences between the committees are to be covered by ambiguous terms their definitions will be useless. Definitions must necessarily be definite to be serviceable.

Some words of the industrial art vocabulary are, we fear, almost past defining. Perhaps these words may better be briefly described. A brief description may be a clearer expression of meaning than an attempted definition of a general term. And we look for the use of a simple language by the committees in their definitions and descriptions. The committees will deal with terms relative to art and education. Here the skill and understanding of these committees will be taxed to the uttermost. Just as an example to be avoided we submit the following definition of art, presented by a recent writer for a technical magazine: "Art is the causative, cosmic, compelling and coercive force which co-ordinates, harmonizes, and unifies activity of mind, to the end that there shall be evolved out of chaos, symmetrical development of our master powers, our control over and identification with the cosmic factors." As a definition this is as clear as mud. It does leave one conviction in the mind of the reader. It convinces the reader that he may never hope to know much about that strange thing called *art*.

There is no greater necessity for intelligent discussion of educational matters at present than definite meaning of the terms manual, industrial, and vocational as applied to education. Let us hope these committees may establish definite meanings for these terms which are now used so variously.

THE CLEVELAND REPORT.

THE summary volume of Industrial Education Survey of Cleveland by R. R. Lutz is well worth the serious consideration of every teacher of industrial arts. It proves quite conclusively that our first type of manual training course did not, and does not, offer a possible solution of the problem of industrial education. It shows the limitations of the present manual training courses in a manner that leaves no room for controversy. All of the fourteen "conclusions and recommendations" are evidence that the survey has been made thoroly and that they were made only after thoughtful consideration of all the elements in the problem. The recommendations are printed in another part of this issue.

It will be difficult for many to agree with some of the conclusions, possibly because we have not

investigated the problem as thoroly as have the investigators. It is possible, however, for one to be so near to a project that all perspective is lost. From a distance we question if "industrial training for girls will consist in the main of preparation for the sewing trades. Practically no other industrial occupations, in which large numbers of women are employed, possess sufficient technical content to warrant the establishment of training courses in the schools." We read that in Europe women are working in machine shops, electrical shops, in the building trades, and in fact in nearly all the occupations formerly considered as men's work exclusively, which seems to prove that it is not impossible for women to do this work efficiently. Will these women now employed in these skilled trades in Europe be content to return to the wash tub, the scrubbing, and the power sewing machine? On the contrary will they not at least make the effort to remain in the better paid and on the whole more desirable occupations? And if the women of Europe remain in occupations of this class, will American women remain at the laundry and scrubbing work which most men would refuse to do? We confess we are not qualified to answer these questions, but from a consideration of conditions which we have not even seen, we suspect that the final word regarding industrial education for women has not been said and will not be for some time.

In attempting to forecast the occupations of the present school population of Cleveland the survey made a very careful study of the occupations of American-born workers in Cleveland and based their assumptions on the "important fact that has been almost invariably overlooked, that many of the present carpenters and machinists are foreigners by birth and that there is every prospect that this same condition will remain in the future. Hence these trades and most other industrial occupations are not recruited from our public schools to anything like the degree that has been assumed." Is it not possible that these skilled trades are not recruited from our public schools because the schools do not train boys for these trades? Can we assume that because the skilled trades have in the past been largely occupied by foreigners that they will be so in the future? Are we to depend upon Europe to furnish our skilled workmen? If so, what are our American boys to do? Will the tide of immigration never ebb? Now that national aid to vocational education is a reality, will we not at least plan to prepare our youth in large numbers for the skilled trades?

We heartily agree that "the most important contribution to vocational education the elementary schools can make consists in getting the children thru the course fast enough so that two or three years before the end of the compulsory attendance period they will enter an intermediate or vocational school where some kind of industrial training is possible."

DRAWING AND ART.

THE final conclusions of Professor Fred Carlton Ayer in his "Psychology of Drawing" should be significant to the art teacher who may be led by recent criticisms of drawing as a school subject to the conclusion that "learning to draw" has gone out of style in Art Education.

Professor Ayer is concerned in his experiments and conclusions with drawing as an aid to the teaching of science.

Representative drawing which records minute visual effects has been common practice in the teaching of science. School drawing which supplements the teaching of science has been minute but without specific purpose. According to Professor Ayer much time has been lost in this operation. He recommends that "The direction of laboratory teaching be specifically adapted to the *scientific purport of the hour*, and that the device of representative drawing be supplanted in laboratory teaching by the use of description, memory drawing and analytical drawing."

Just as the teacher of science may use drawing as an aid to the impression of scientific fact and principle, so may the teacher of art use drawing as an aid to the impression of beauty in nature and art. The point of importance to the teacher of art is that the drawing must be adapted to the *artistic purport of the hour*.

Much time has been wasted in drawing lessons which were misdirected to record the incidental facts of nature, and to overlook the elements of beauty in nature. Drawing has been, is, and always will be a means to an end in realizing and appreciating beauty. We do not need less drawing but more impression of beauty.

Continuation schools for the education of child workers have been opened in nearly every section of Philadelphia, until now there are 74 regular classes and five shops. In these classes there are taught approximately 9,500 children who have not had the advantages of a grammar school education and in whose interest the state has compelled employers to co-operate with educators and to open up the way for the better education of these workers.

In the fall, there were opened fourteen additional academic classes and three additional shops. At present the shopwork is for boys only but as soon as sufficient funds can be obtained, it is planned to offer similar work for girls. Where academic studies are taught, each child attends classes six hours weekly, the shops adding two additional hours to the weekly sessions. High school classes have been formed in five of the high schools and there are approximately two hundred children taking up higher studies.

In the opinion of the school authorities there will probably never be more than ten thousand pupils in continuation schools so that the system has about reached its numerical limits. From now on it will be necessary to devote all energies to the improvement of the system.

TYPE OF TEACHER REQUIRED FOR CONTINUATION AND INDUSTRIAL SCHOOLS

Mrs. Mary D. Bradford, Superintendent of Schools, Kenosha

"As the continuation and industrial schools have developed, the same thing seems to have happened that has come about elsewhere in educational development, a specialization in instruction. Teachers in these schools fall into two general classes, the vocational teachers and the non-vocational.

To the former class belong those who give instruction of any kind which directly improves the vocational efficiency of the worker at his trade or calling.

To the latter, the non-vocational, belong those who give instruction of any kind which improves the general education, or the civic efficiency of the student, as English, civics, hygiene, and sanitation, general science.

The former contributes to one's ability to make his or her living; the latter helps to make the living worth while, helps to make a life.

Among vocational teachers there are two distinct lines of work, which divide this class into those who teach shopwork, and those that teach the work immediately related to shopwork. These subjects may be taught by one person, but, if separated, there is (1) the shop teacher, the person who knows the trade in a practical way, and (2) the teacher of related vocational subjects, such as mechanical drawing and shop mathematics, and others that directly aim at increased vocational efficiency.

Qualifications that fit a person to be a teacher of boys or girls in one of these classes of activities, may be more or be less than those that best fit him for the other work. It seems best, therefore, in this discussion to consider separately the preparation needed by the teacher for each of the three somewhat specialized lines of work, the shop teacher, the teacher of related vocational subjects, and the teacher of the non-vocational subjects.

The ideal shop or practice teacher must possess three forms of qualifications:

(1) A fair general education.

(2) A practical knowledge of the industry for which he is preparing young people.

(3) An understanding of some of the general principles of pedagogy, that he may be able to impart what he knows.

A teacher who possesses all these three forms of qualifications in a high or even medium degree is difficult to find. To be a skilled workman, means years of training and experience in the shop. To get this means an early start, at 16 years of age probably, and this would necessarily mean that the fundamental educational training had reached little beyond the eighth grade. He may have added to this by evening work, but even then the person would lack teaching experience. Difficulty would be found in managing classes and in imparting knowledge to others, so that the advantage of superior skill is negatived by the disadvantage of inferior teaching ability.

On the other hand the trained teacher has knowledge of teaching, but lacks the practical experience with the industries.

These are the two types between whom the school has to choose the teacher for the shopwork—the skilled worker, not trained as a teacher, and the professionally trained teacher, who knows the theory of the trades, but has little practical experience. Which is the better of these is the question, and people are not agreed upon it.

Some believe that pedagogy is the basis, and select the teacher who possesses that and with it enough knowledge of the subject to enable him to meet the problems of the school shop.

Others believe that the industrial atmosphere which a practical shop man carries with him, and the methods and standards which only the practical shop man knows about, are the right thing. These maintain that any mechanic who possesses a sufficient degree of intelligence to become a candidate for a teaching position can be trained sufficiently in methods of instruction to make him or her the better type of shop teacher.

They say that because this sort of teacher knows the qualities which certain industries demand, he can help most effectively in the work of vocational guidance of the youth under him. The others object to this, by pointing out that the shop-trained man may lack the broad point of view needed in vocational guidance, and may emphasize his own trade.

It is not impossible now to find the combination of all the three qualifications named, but this preparation means such a large investment of time and money on the part of the one so qualified, that the salary due him is far beyond the ordinary standard, and puts this sort of teacher beyond the reach of our continuation and industrial schools.

Before satisfactory conditions in the teacher market can be reached—satisfactory both to employer and aspirant to teaching efficiency in this field, training will have to be undertaken on the scale and under the auspices towards which Federal action is aiming.

The question now arises, what may reasonably be considered necessary in the way of general education for the shop teacher. It would not seem unreasonable to put the level of this attainment at a year at least beyond that of those he is called upon to teach. We know that, while skill in doing with his hands readily wins for the teacher the admiration of pupils, respect is added to admiration when the teacher knows and can explain something of the scientific basis of his work, and has a fair general knowledge which may be turned on as a sort of side light when occasion demands.

As to the knowledge of pedagogy, extensive study is not necessary. Common sense and real teaching intuition without a knowledge of principles often result in greater success in the schoolroom than pedagogical knowledge without the other qualifications. But we all know that an art that has roots reaching down into the underlying science is always the art that grows and explanates into greater and greater skill; so teaching that is done in the light of the scientific principles of psychology and pedagogy is bound to be more effective than teaching of the empirical or imitation sort.

There is nothing in pedagogy that a person of ordinary education should shy at. They will readily recognize as soon as they begin to read it that much of the most important pedagogy is merely good common sense applied to teaching.

I was once asked by a working man to explain to him what was meant by the doctrine of apperception to which he had heard allusions made. After the explanation, he said, "Oh yes, I see, it simply means that if you want to go anywhere you must start from where you are." So that principle of apperception, which Col. Parker used to say controlled the success of nine-tenths of all the good teaching that ever had been or ever would be done—the principle that new knowledge can be acquired solely thru the help of old knowledge related to the new, is not difficult to understand, and once understood, ways and means to its application in our teaching become an interesting study, and finally an almost habitual procedure on the part of the teacher.

So with the principle of interest, we all know, whether we have ever studied pedagogy or not, that work which effects a healthy stimulation of the emotions as well as of the intellect is the work that counts for the most. It was the interested "Builder of the Ship," the man with a strong motive, of whom the poet said,—

"For his heart was on this work, and the heart giveth life unto every art."

How to give work this emotional accompaniment we call interest is the supreme teaching art. One means to it is skill in applying the principle of apperception, previously touched upon.

Now let us consider the type of teacher for the related vocational subjects. We must look to the technical schools

for these. The graduates of these schools have had the special training needed for the teaching of mechanical drawing and shop mathematics, and with some practical shop experience, to put them in sympathy with the industrial workers, they are the type of teacher needed for the boys.

The technical schools are also the source of supply of the women teachers who must carry the work in cooking and sewing.

For the non-vocational teacher a normal school graduate with some, but not too much, experience is best, altho others especially adapted to this field may succeed in it. But normal school graduates or not, the person needs to have a sympathetic insight into industry.

The non-vocational teacher cannot use the methods followed in the regular elementary or high school. The work must be of such a character that it functions in the lives of the individual pupils. I would choose for this work people of broad general scholarship, and with active sympathies, people who can find out the needs of the unclassified lot of children who come to them, and who will have the willingness, the skill, and the patience to minister to those needs—intellectual, moral, physical, social.

I have said little about the personal equipment of those who are to teach in these kinds of schools. Suffice it to say that the standard set for the regular school should in no way be lowered in this. Boys need men whom they can look up to as ideals in manners, habits of dress, and of living, and girls need women of the same sort and for the same reason. Those whom boys and girls admire they strive to emulate and imitate.

As to the attitude of mind, the teachers of these schools should surely be people who are progressive and open-minded, and who have not ceased to grow.

For all sorts of teachers, vocational and non-vocational, I would name another common quality, characteristic or possession which I think to be of immeasurable value. It is a live social consciousness. It is this that gives the teachers faith in their work and enthusiasm for it; because they feel that in ministering to these children in industry, they are performing a high form of service to the community. The social consciousness is the realization that the social whole can claim no better or higher status than that which is the average of all its component elements; and that all effort to lift a little higher the level of even the "least of these" contributes to the general social benefit.

It is this attitude which makes any teacher a high type of teacher, and such types are needed especially in our continuation and industrial schools."

SAFETY FIRST IN THE SCHOOL SHOP

C. M. Haines, Fort Worth, Tex.

Government statistics show that, during the year 1913 there was an accidental death every ten minutes and an accidental injury every sixteen seconds. These figures are enormous and in a great many cases these accidents were preventable.

The school shop contains all of the dangerous machinery of the school plant and every year there are accidents that are, in most cases, preventable if the proper precautions are taken. It is the purpose of this article to impress upon the minds of the industrial teacher his responsibility for shop accidents and also to give suggestions for first-aid in case of accident. It is not so much that the instructor and the board of education are liable for suit but it is the fact that the boy injured must go thru life maimed and often times thru no direct fault of his own. There is very little danger resulting from the use of the ordinary hand tools found in the woodworking shop if proper care is taken to prevent infection of the wound.

All power machinery should be guarded. Every company manufacturing woodworking machinery supplies sufficient guards for the protection of the workman operating each machine and it is poor economy on the part of a board of education not to purchase all the guards for each machine at the time of the purchase. Not only should all machines be well guarded in themselves but also the motors, electric switches, and belts should be enclosed in heavy wire guards. When installing any power machinery "it is better to be safe than sorry" even tho the initial cost is somewhat increased.

In the forge shop, machine shop and foundry the rules of the wood shop should be applied to the guarding of all machinery. The emery grinder should be especially well guarded and goggles furnished so that there will be no danger from flying pieces of emery. The emery grinder is a very dangerous machine and at the same time one of the most used machines in the shop.

Every shop should contain the following first-aid kit as recommended by the Division of Agriculture and Industrial Education of the State of New York.

Instruments—
1 pair scissors.
Thumb forceps.
Tourniquet.
Graduated medicine glass.

Drugs—
2 oz. aromatic spirits of ammonia.
2 oz. four per cent boric acid.
2 oz. alcoholic iodine solution, one-half strength.
2 3-oz. collapsible tubes of bicarbonate of soda with vaseline 3 per cent (for burns).
2 oz. castor oil (for eye injuries).

Dressings—
1 doz. assorted sizes sterile gauze bandages.
1 spool Z O adhesive plaster, 1 inch by 5 yards.
3½-oz. package absorbent cotton.
Splints of assorted sizes for fractures.
Wooden applicators wound with cotton.
Wooden tongue depressors.
First call a doctor if it is a bad accident.

With this equipment practically all shop accidents can be really given first-aid treatment. If it is impossible to purchase all of these supplies, small cuts may be made antiseptic by the application of turpentine and an antiseptic bandage. The most difficult part in treating small cuts and bruises in the shop is to get the pupil to report them to the instructor. No wound is so small that it may not become infected but most pupils think it unmanly of them to report to the instructor and let them go.

A set of shop rules governing the pupils' conduct should be printed and a copy given to each pupil. To see that both he and his parents read them a blank statement to the effect that the rules have been read and understood by both should be attached, to be signed by the parent and returned to the instructor. This should always be done when the pupil is to use power machines.

Schoolshop accidents can be almost wholly eliminated if proper precautions are taken and if the instructor realizes his responsibility for these accidents.

STORING UNFINISHED WORK.

A. B. Anderson, Albuquerque, N. Mex.

The problem of storing unfinished work is one of vital importance in all well organized manual training schools and has been a subject of considerable discussion among manual training teachers. If the work is stored where any and all students have ready access to it unhappy consequences are sure to follow and the installation of expensive lockers would be out of the question in most schools. After giving the subject careful study and experimenting with several methods, the writer has worked out a system which seems to solve the problem very effectively.

A separate room is used, or a small part of the main shop may be divided off (which also will contain the tools and supplies), in which are placed pigeon-holes of a size about 14 inches wide by 24 inches high by 12 inches deep and amounting to one-half the number of students to be accommodated. It has been found by experience that two

students' work can be kept in one compartment very conveniently. Space is left beneath the pigeon-holes to accommodate work under construction which might be too large for the compartment.

Each boy makes for himself a tag upon which is stamped in large, plain figures, his section and bench number and which has attached to it a heavy cord about three feet long. The unfinished pieces can usually be wrapped in a neat bundle and tied with this cord. In this condition they are handed in to the boy in charge of the supply room who places them in the proper compartments.

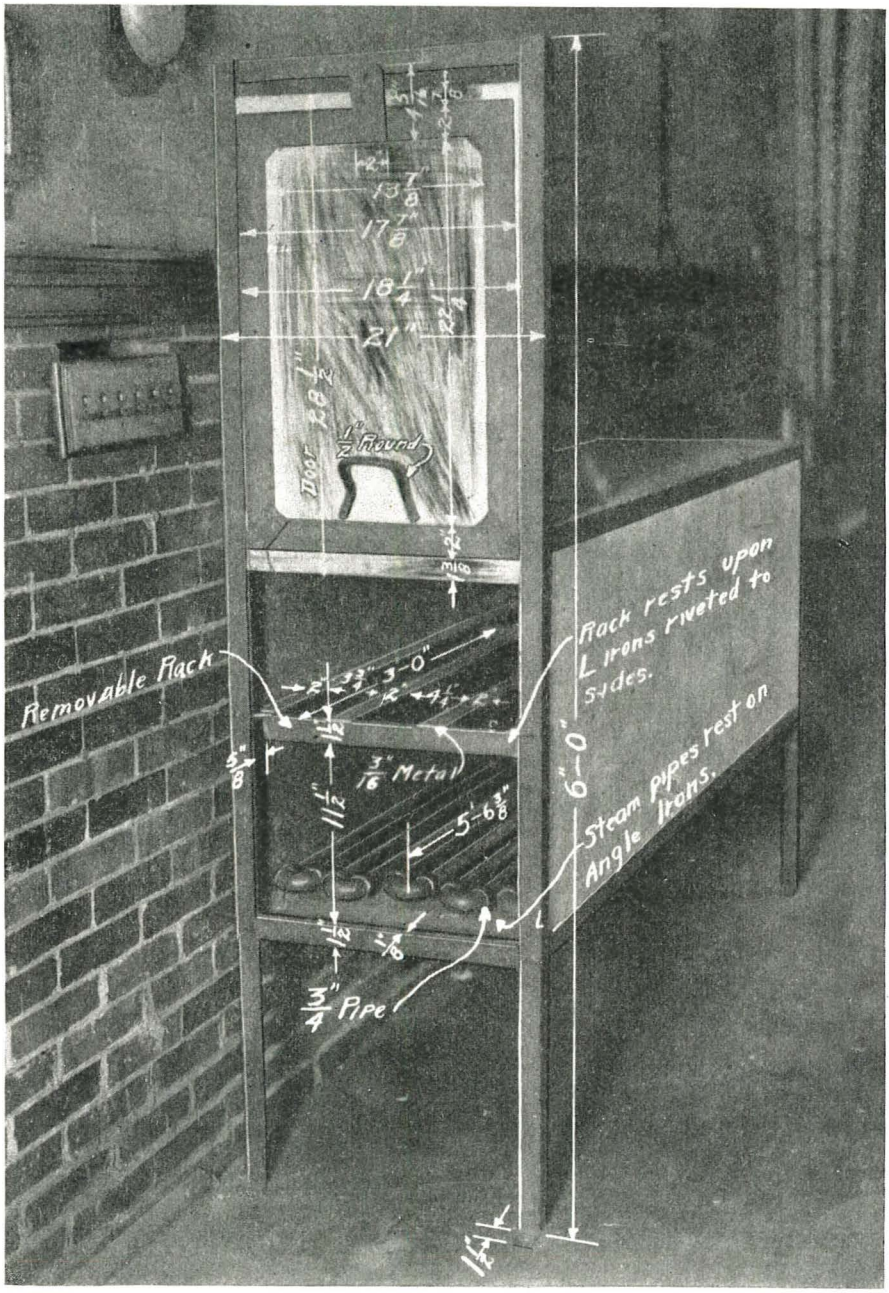
One boy is appointed from each class to serve from two to four weeks in the supply room. He devotes his entire class time to dealing out work, tools and supplies to the other students and receives them at the close of the period.

The many advantages of this system will readily be seen. The work is stored where it may be readily inspected. No lockers are used where spoiled pieces may accumulate during an entire year. The tools, supplies and work are taken care of in a systematic manner by the boy in charge who, alone, is responsible to the instructor for the same.

PHOTOGRAPHS FOR MECHANICAL DRAWING.

The Department of Industrial Arts of the Cincinnati schools has devised a unique method of presenting problems in mechanical drawing to students. The accompanying photographs will illustrate and explain the method.

The department recently built a metal box for heating lumber before gluing. It was proposed to build a dozen similar boxes in as many schools. Two photographs of the original box were accordingly taken and were dimensioned as shown. The pictures were then sent to the several school shops and were handed to students who prepared working drawings for similar boxes. It will be noted that all of the essential information which a boy needs for making a drawing is indicated on the photographs.



FRONT VIEW OF HEATING BOX.

The plan has worked splendidly and Mr. E. W. Christy, Director of Industrial Arts, is planning to extend it and to provide a large number of pictures which may be used by the instructors in mechanical drawing. It is believed that the photographs will provide a much greater variety of projects than would be possible by any other arrangement.

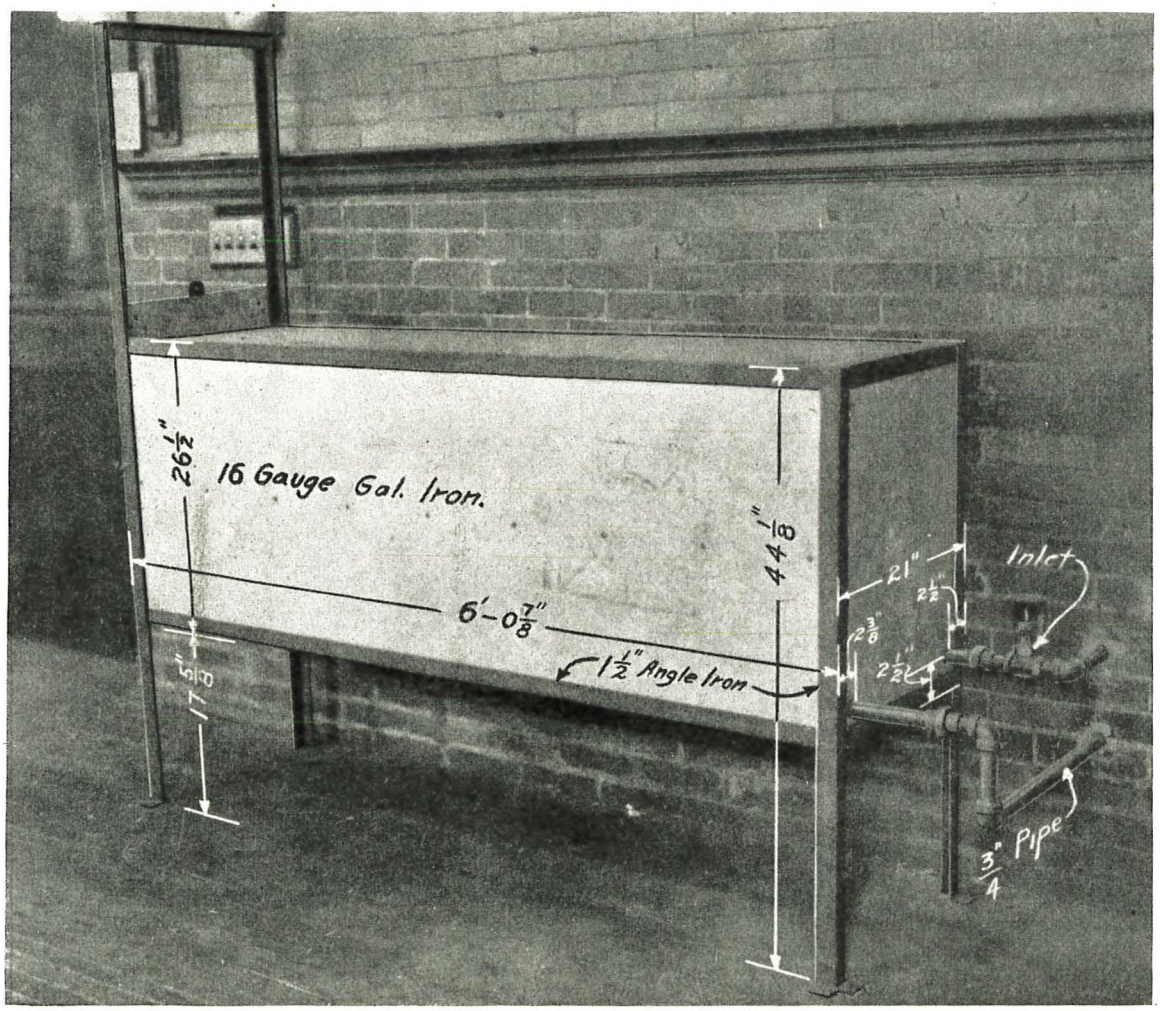
SECOND REGULAR MEETING OF THE SCHOOL CRAFTS CLUB.

The second regular meeting of the School Crafts Club was held in the New York Electrical School, Saturday evening, January 13, 1917. There was an unusually large attendance. The first part of the evening was spent in going thru the school examining the equipment and looking over the work and methods of instruction.

After President Merritt W. Haynes had dispatched briefly the business of the evening, the meeting was turned over to Joseph H. Constantine, chairman of the program committee. Mr. C. V. O'Brien, President and Director of the New Electrical School, was next called upon. The school was established sixteen years ago in 42nd street, by a corporation for the two-fold purpose of giving electrical instruction and dividends to its stockholders. It has paid only in educational return but these to a very gratifying degree. The school is the first of its kind and has kept strictly to electrical lines and developed five departments: (1) Telephony, Telegraphy, Burglar, Fire Alarm and Wireless Systems; (2) Direct and Alternating Current, Switchboard and Machine Installation; (3) Armature Winding, Repair Shop and Machine Shop; (4) Interior Light and Power Wiring, Estimating and Contracting; (5) Electrical Machinist Work and Mechanical Drafting. It is interesting to note that the famous electrical engineer, Dr. Chas. P. Steinmetz, is on the advisory board of this school.

The management of the school is unique in many respects but especially with regard to attendance and pursuance of the courses. Once a student matriculates he is always a member of the school. He may begin any day or hour of either the day or evening sessions. He may come when he can during the day and even continue his work in the evening. School work may be done at any school period, the course to be pursued at the convenience of the student. After the prescribed work is done, and after he has been graduated, he may return at any time for review or advanced study, without further cost.

With all this elasticity in instruction, in order to get the school diploma, the student must cover a prescribed course, no matter how long it may take. The course begins with drafting as applied to electrical construction and advances to simple wiring, then to a study of machine work with direct current. Next comes armature winding and the study of dynamos, finishing with lighting and wiring.



SIDE AND REAR VIEW OF HEATING BOX.

The requirements for entrance are proficiency in the "Three Rs." However, this standard is sometimes modified to admit students from foreign countries. Every nationality except the Eskimo has been represented in the school's classes. The school is doing work along sound educational lines and is turning out competent workmen.

The next speaker, Mr. H. Frank Smith, of the publicity department of the Mergenthaler Linotype Co., gave a lantern slide talk. It would be impossible to do justice to this talk without showing the slides. Mr. Smith prefaced his outline of the invention and development of this wonderful machine by telling the historical incident of Hadrianus Junius, who cut letters in tree bark, separating the letters to form words, which gave the idea of movable type. He recounted how type was first cut in wood and cast in lead and how movable type displaced the work of the famous copyists whose remarkable specimens of lettering are now in our museums. Inasmuch as hand-cut letters were necessarily crude, the making tedious and slow and the demand for printing more

and more insistent, improved methods of type casting developed.

Mr. Smith described the making of type composing and casting machines. He also told of the unsuccessful results which usually precede such undertakings. The first composing machine which was successfully made and is now on the market is the Unitype which sets specially nicked type and takes the place of about three hand compositors. He mentioned the principle of the Monotype which casts and sets individual type. This machine is controlled by a perforated roll of paper similar to that used in the player-piano.

The machine which has revolutionized straight composition and made possible the vast number of modern publications was developed by Ottmar Mergenthaler, the early circumstances concerning whose work Mr. Smith interestingly related. The slides shown began with the very earliest machines developed by Mergenthaler and those that followed, up to the wonderful modern ones which give the operator control of seven hundred different characters.

The meeting held in this uniquely successful school and addressed by specialists in their lines was terminated by an unusually agreeable social session and an unexpected buffet luncheon given by the school. The new year-books were distributed at this time.

THE VOCATIONAL EDUCATION ASSOCIATION OF THE MIDDLE WEST.

The cause of Vocational Education in the west was greatly advanced January 18, 19, and 20, at the third annual meeting of the Vocational Education Association of the Middle West. The meeting was held in the Auditorium Hotel, Chicago. It was a great meeting from every point of view. The attendance was unusually large, the spirit and enthusiasm were high, and the program presented as strong an array of talent on this particular subject as has appeared at any meeting in this country.

The recent passage of the Smith-Hughes Bill gave point and added zest to the various discussions. The one very noticeable characteristic of these discussions was the fact that definite proposals were presented, actual plans and systems that had already been put into successful operation were described, and very little quibbling on inconsequential matters was indulged in. There was a kind of get-together feeling abroad and a disposition manifest to meet the vocational problems fairly and squarely and to undertake their solution in a spirit of harmony. This is a very marked departure from the traditional methods along these lines in the middle west.

People from distant states took advantage of the registration time Thursday morning to visit schools, museums, industrial plants, and other places of interest in Chicago. In the afternoon of Thursday, the meeting was started in earnest by the president, Mr. George H. Miller, Welfare Manager of Sears, Roebuck and Company. The subject of this particular session was Industrial Preparedness. Able and timely addresses on the various phases of this topic were given by Dr. David Snedden of Columbia University, Dr. Frederick W. Roman of Syracuse University, and Dr. Wm. T. Bawden of the U. S. Bureau of Education.

At the Thursday evening session, Work for Women was the subject of discussion. This was one of the most important and interesting sessions of the entire meeting. Miss Florence Marshall, Principal Manhattan School of Trades for Girls; Miss Abbey Marlatt of the University of Wisconsin; and Dr. Snedden were the principal speakers. The turn which the discussions took, and the witty and pointed remarks of the lady speakers showed very clearly that they were not in full accord with Dr. Snedden's conclusions on the matter of the Double Problem of Vocational Education for Women. The clash of opinions precipitated some interesting and spirited debates.

Agricultural Education was the subject for the Friday morning session, which was presided over by County Superintendent Edward T. Tobin of Cook County. The main addresses were given by Mr. Matthew P. Adams, Director of Mooseheart Vocational Institute, Mooseheart, Illinois; Mr. Eban Mumford of the Michigan Agricultural College; and Mr. Frank B. White, Managing Director of Agricultural Publishers Association. This session was well attended by those directly concerned with the problems of education in relation to Agriculture.

In the afternoon of Friday, Vocational Education and Organized Labor was the main topic. Labor's attitude toward the vocational movement was very clearly and ably defined by Mr. Matthew Woll, Chairman of the Committee on Education of the Illinois State Federation of Labor. He placed organized labor in the very front rank of the advocates of wise vocational education as an integral part of the public school system. Dr. Chas. A. Prosser, Director of Dunwoody Institute, Minneapolis, gave an address on Trade Agreements. This was a resume of the methods employed and the work done in the Minneapolis Survey.

Certainly one of the most delightful occasions of the meeting was the annual banquet on Friday evening in the great Banquet Hall of the Auditorium Hotel. After the four hundred banqueters had done ample justice to the sumptuous dinner, the program was turned over to the toast-master, Mr. Wm. J. Bogan, Principal Lane Technical High School. With the skill, the adroitness, the happy humor of the master toastmaster that he is, Mr. Bogan presented the speakers of the evening. Supt. Shoop of Chicago gave the address of welcome, which was a fine mixture of rich humor, the essence of hospitality, and wise bits of the philosophy of education and of life. The main address of the evening was by Dr. Prosser on Principles That Should Govern in the Framing of Vocational Education Laws. This was followed by a very brief but pointed and interesting address by Miss Marlatt of the University of Wisconsin.

Saturday was one of the biggest, if not indeed the biggest, day of the convention. Efficiency and Legislation in vocational matters were the topics of discussion. The programs of the Saturday sessions were made up of such noted authorities as Dr. Harvey of Stout Institute; Mr. Herbert Quick of the Federal Farm Loan Bureau, Washington, D. C.; Dr. Bagley of the University of Illinois; Mr. H. O. Benson, U. S. Department of Agriculture; Hon. David Shanahan, Speaker of the Illinois House of Representatives; Hon. F. G. Blair, Illinois Superintendent of Public Instruction; and Dean L. C. Marshall of the College of Commerce and Administration, Chicago University.

At this meeting, as at all previous ones, the commercial exhibits were a real educational treat. In a large hall adjoining the Banquet Hall where the meetings were held, about thirty of the largest firms that deal in equipments and supplies for vocational work had splendid exhibits in charge of their representatives. These commercial exhibits seemed to be great attractions for the crowd.

A vote of thanks for the excellence of the meeting is really due Mr. Miller, the President, Mr. Bogan, the Chairman of the Program Committee, and Mr. Bauersfeld, the Secretary.

The following officers were elected for the ensuing year: President, S. J. Vaughn, DeKalb, Illinois; vice-president, A. G. Bauersfield, Chicago; secretary, Leonard W. Wahlstrom, Chicago; treasurer, Clara H. Smith, Chicago.

The board of industrial education of Racine, Wis., has been working for some time for a closer co-operation of the public schools and continuation schools along industrial education lines. Some two months ago an experiment was undertaken in which all classes in machineshops were consolidated in one building and all those in electrical construction in another.

The success of the idea convinced the board that additional consolidations would make possible further economies in the general management and finances. Accordingly plans were made early in December for a conference of the representatives of the industrial board, the manual training committee of the school board and the regular committees to discuss the consolidation of manual training and domestic science departments of the two schools.

The suggestion was welcomed by the members of the school board and a committee was appointed to represent the board. The results of the conference will be announced in the near future.

PROBLEMS AND PROJECTS

The Department of Problems and Projects, which is a regular feature of the INDUSTRIAL-ARTS MAGAZINE, aims to present each month a wide variety of class and shop projects in the Industrial Arts.

Readers are invited to submit successful problems and projects.

A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing and a good photograph. The originals of the problems in drawing, design, etc., should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are eligible for consideration.

Drawings and manuscripts should be mailed flat and should be addressed:

The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

CARVED LIBRARY TABLE.

Leslie G. Martin, Meriden, Conn.

This project is offered as one giving the student an opportunity for design as well as the acquisition of skill in the handling of various tools.

The table is adapted from the Adam style. The side rails are carved with straight lines, care being taken to keep them clean and round at the ends. In the center of three sides is carved a characteristic Adam ornament. The draw front has a small carved urn as shown in the drawing. The sides of the draw are dove-tailed. The legs are tapered with characteristic spade foot. Two sides are fluted to give the appearance of lightness, and decorated with a carved oral near the top. The stretcher contains a caned panel. The edge of the stretcher and rail beneath top are carved with a small key pattern as shown in drawing.

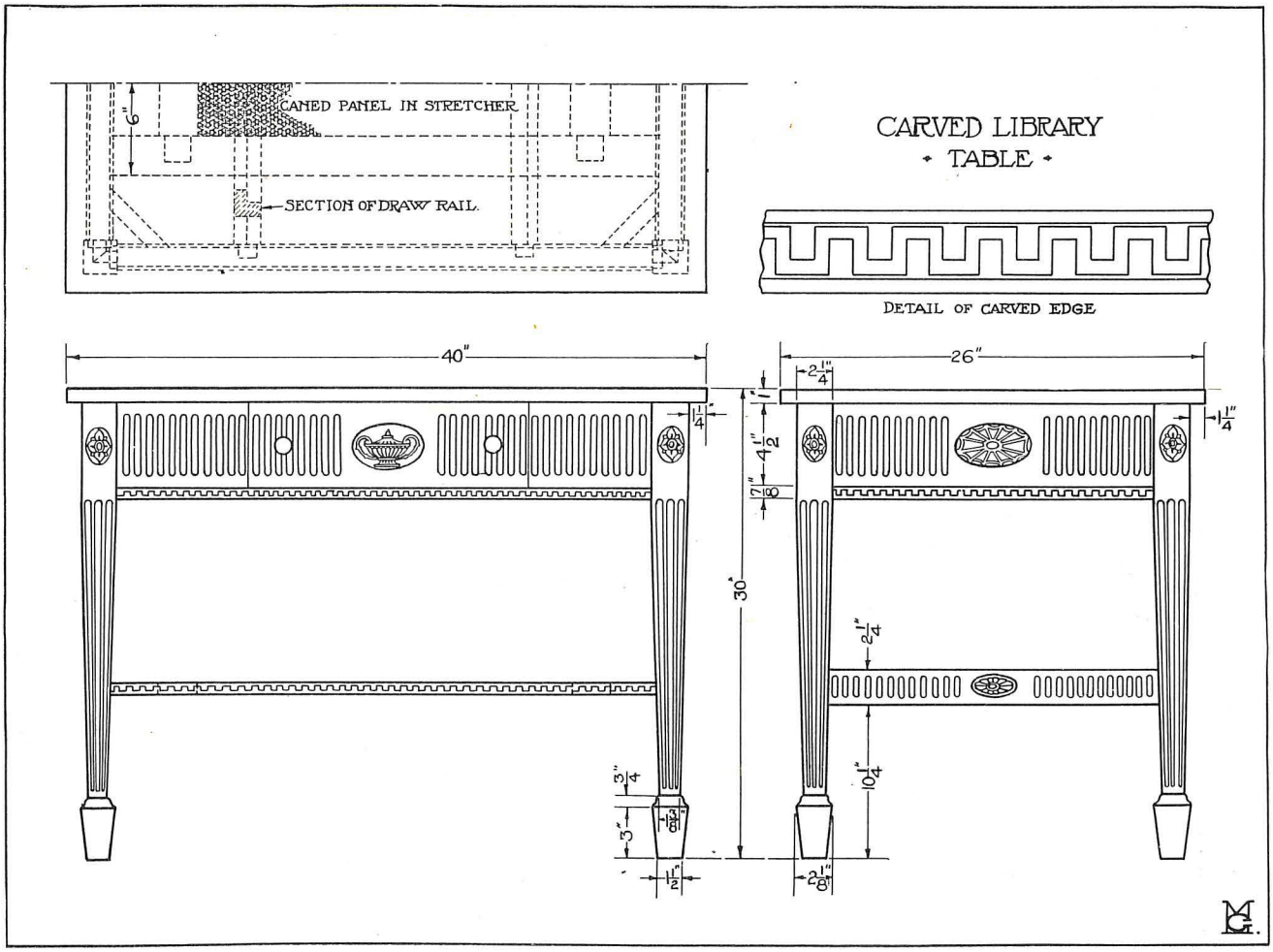
The table is constructed of black walnut and finished with a thoro rubbing of linseed oil, then given two thin coats of shellac and waxed.

Table Designed by Mr. Leslie G. Martin.

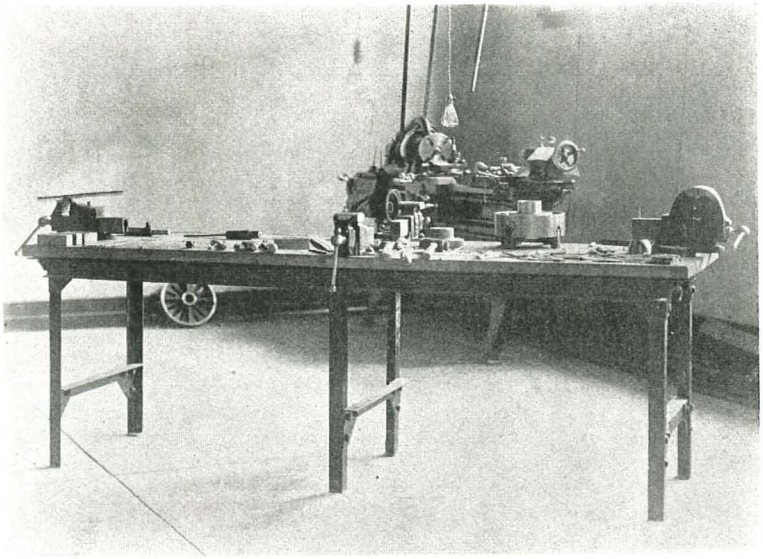
STEEL FRAME SHOP BENCH.

J. P. Pinney, Mishawaka, Ind.

With the installation of our machineshop equipment, we felt the immediate need of a shop bench that would ac-



Details of Carved Library Table.



Bench for School Shop. Designed by Mr. J. P. Pinney.

commodate at least four students at a time. The common practice in machineshops, including schoolshops, is to place the bench along some wall where it will be out of the way as much as possible regardless as to whether the light be good or bad.

But why should not the instructive merit of any part of a schoolshop equipment influence its location on the shop floor and especially if the workman needs frequent council with the instructor? Now, is there any more important piece of machine equipment than the shop bench where the initial laying out of much of the work is done and the final finishing, fitting and assembling is handled?

The bench shown stands near the center of our shop, and directly in front of the instructor's office. In its construction the following materials are required:

2 pieces of 3″ 4 lb. channel, 6′ 0″ lg.
4 pieces of 2″x2″x$\frac{1}{4}$″ angle 2′ $\frac{1}{4}$″ lg., leg ties.
6 pieces of 2″x2″x$\frac{1}{4}$″ angle 2′ 6″ lg., legs.
2 pieces of 2″x2″x$\frac{1}{4}$″ angle 2′ 6″ lg., across ends at top.
6 pieces of 2″x2″x$\frac{1}{4}$″ angle 1$\frac{3}{4}$″ lg., clip angles for legs.
12 pieces of 5″x5″x$\frac{1}{4}$″ steel gusset plates.
2 pieces of 5″x6″x$\frac{1}{4}$″ steel gusset plates.
60 $\frac{1}{2}$″x1″ sq. hd. mach. bolts.
22 $\frac{1}{4}$″x3″ carriage bolts.

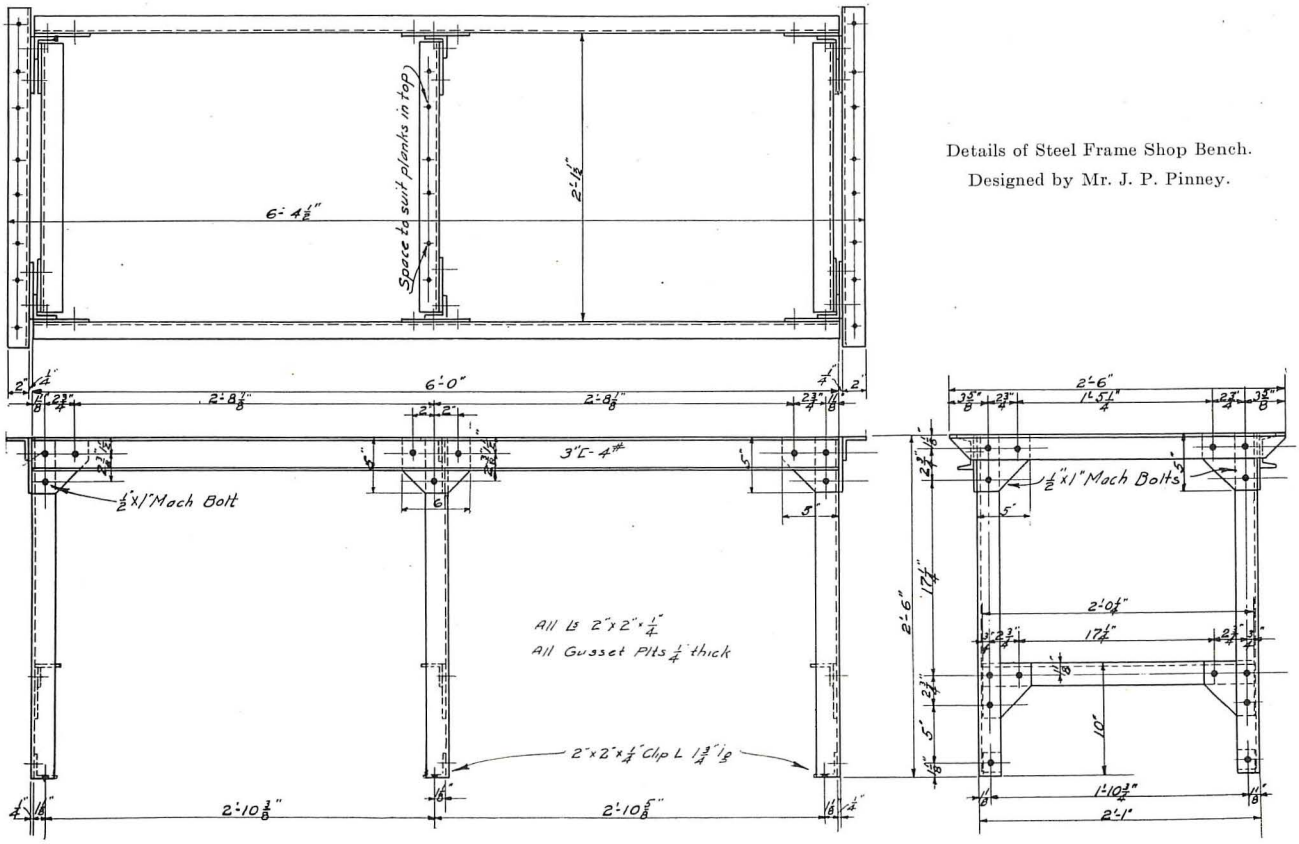
This design was worked out by James Beard by the third-year mechanical drawing class and was built in the machine shop by the entire class. The structural shapes were cut with the power hack saw, the gusset plates were purchased cut to dimensions shown on the drawing, and all bolt holes for securing the frame together were drilled with a one-half inch drill. The top of the bench, which consists of four two-by-eight-inch pine planks six feet eight inches long, were fitted together, clamped to the steel frame and the bench moved under the drill press where the bolt holes for the planking and vise were drilled. The bolt holes for the planking were countersunk so as to bring the top of the carriage bolts flush with the surface of the bench.

The weight of the steel in the frame is 185 pounds from which the cost was calculated. A bench of this design adds to the appearance of the shop rather than detracts from it, as would be true in the case of a clumsy wood frame bench; besides we have furnished our machineshop class with a very practical problem in design and construction.

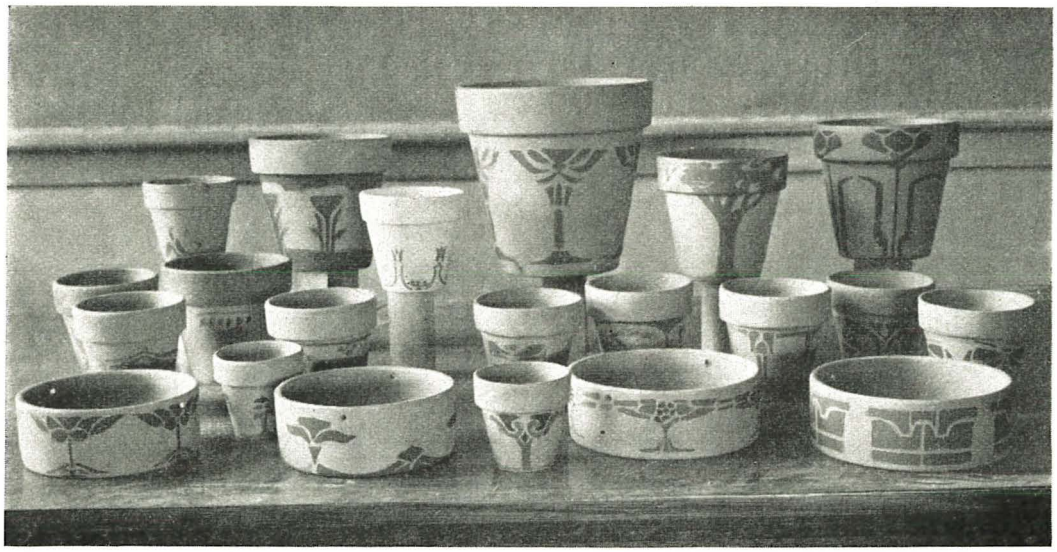
A DECORATED FLOWER POT.

L. Eveline Merritt, Head of the Art Department of the State Normal School, DeKalb, Ill.

The drawing teacher is always on the lookout for problems which are practical for the schoolroom, which have a real place in either the home life or school life of the child and which can be worked out in an inexpensive way. Such an one is the flower pot which in itself is quite ugly but which



Details of Steel Frame Shop Bench.
Designed by Mr. J. P. Pinney.



Flower Pots Decorated by Students of the Normal School. Some of the Designs Were Worked Out in Pencil Rather Than by Cutting.

may become a thing of beauty by the application of a little ordinary house paint and a rather inconspicuous design that is in harmony with it. Sixth-grade children are delighted with the problem and can do it well. It is one, too, that adapts itself to individual tastes and abilities.

The flower pots themselves may vary in size and shape while the kind of design used may also be varied. The following are possibilities in the planning:

1. A border on the collar.
2. A border below the collar.
3. A border at the bottom of the pot wider than the collar.
4. Panels.

With children the simplest method of procedure is in paper cutting. Each child should be given his pot, scissors and some thin paper. By fitting the thin paper around the pot and creasing it at the top and bottom, he will be enabled to cut the paper in a shape to exactly fit. By folding this shape into thirds and cutting on the folds, the design is worked out. There should be dominant accents and minor spots to connect them, the dominant spots to be cut on one fold and the connecting links on the opposite. Reference to the illustration will explain this. Care must be taken to make the cuts echo the curved edges of the paper, otherwise they will not follow the lines of the flower pot when applied. The connecting cuts, too, must carry the design around by reflecting the curves of the accenting spots.

The border on the collar is a similar problem except that the cuts will echo the horizontal rather than the curved line.

The common house paint which comes in pint cans is the cheapest and most satisfactory. By getting a can of white and a can of either medium dull green or brown one can mix a little white with a portion of the color thus obtaining a medium and a lighter tone of the same color, a safe harmony to use. Do not have the contrast so great as to be too conspicuous yet have it great enough that the design will show.

Paint the entire flower pot with a flat wash of the lighter value. Allow it to dry 24 hours. The following day fit the paper in which the design has been cut, upon the flower pot, holding it there by rubber bands. With a sharp pencil outline lightly the holes. Remove the paper and paint the spots with the darker value. These values may be reversed if desired.

Sometimes a design is made more attractive by painting a small spot at the accented portions with a bright opposing color. Thus the spots marked "A" in the illustrations might be of a vermillion if the dominant color were a gray-green.

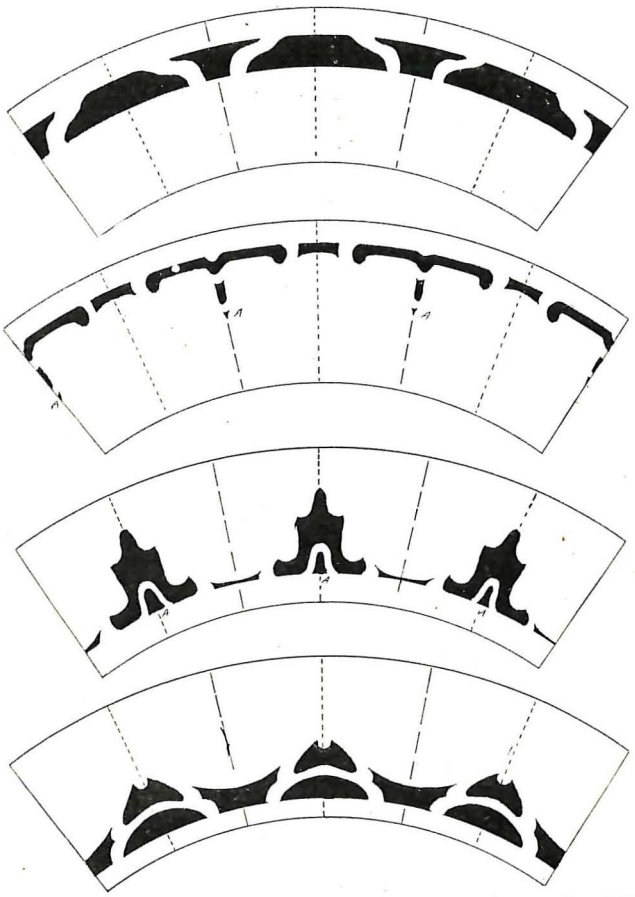
This is oil paint, therefore water-proof. The brushes used can be cleaned with turpentine and soap and water.

A MECHANICAL DUCK.

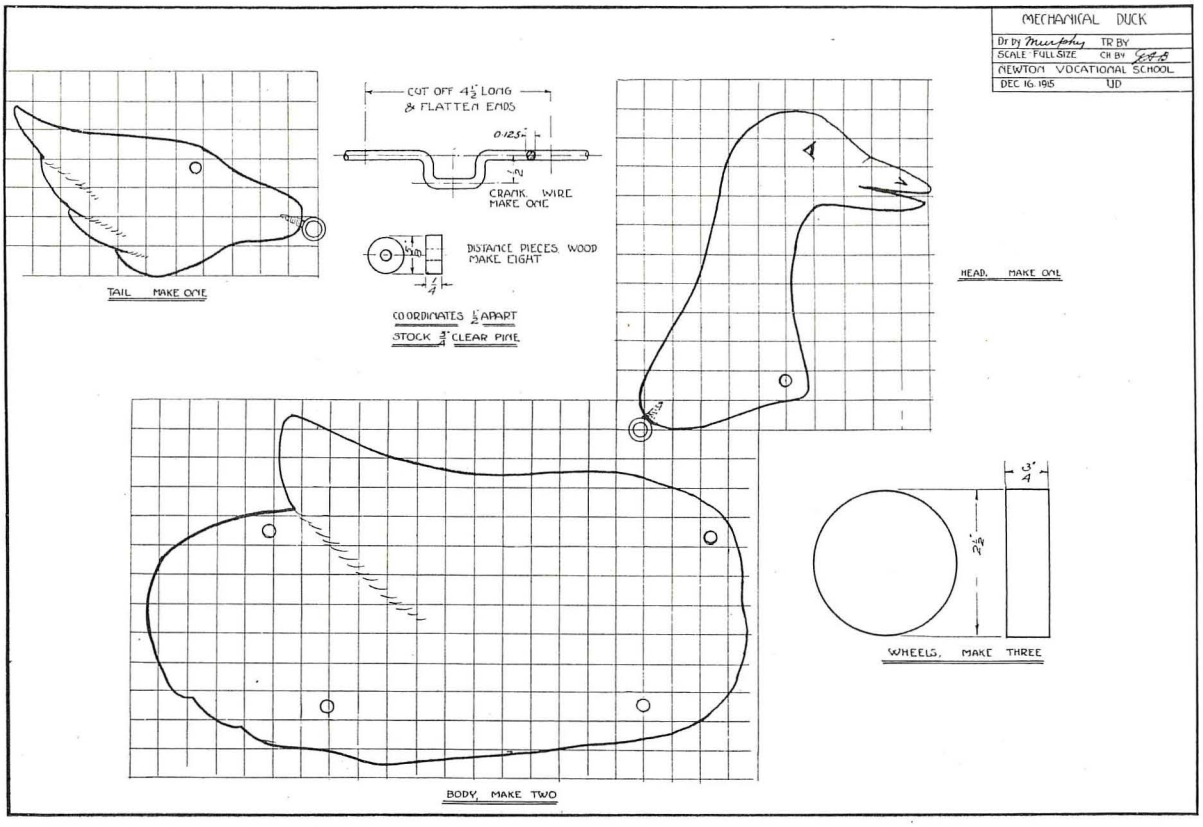
Gerald A. Boate, Newtonville, Mass.

The mechanical duck is a toy which will give the 4-year-old child a great deal of pleasure. If built on the staunch lines which are suggested in the accompanying drawing the toy will withstand a great deal of hard usage, a virtue which very few toys possess. The one shown in this article has been in almost daily use by my small daughter for over a year.

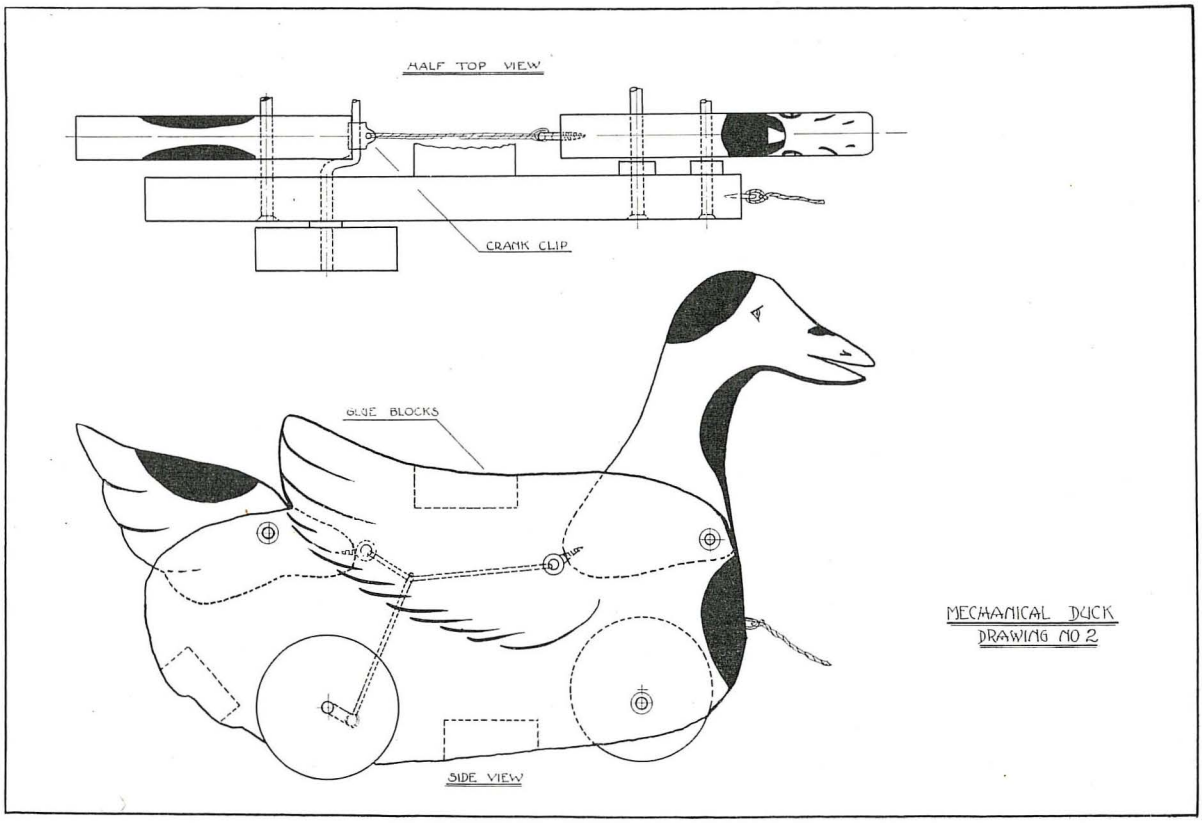
The mechanical operations necessary for the construction of the toy are very simple and may easily be done by



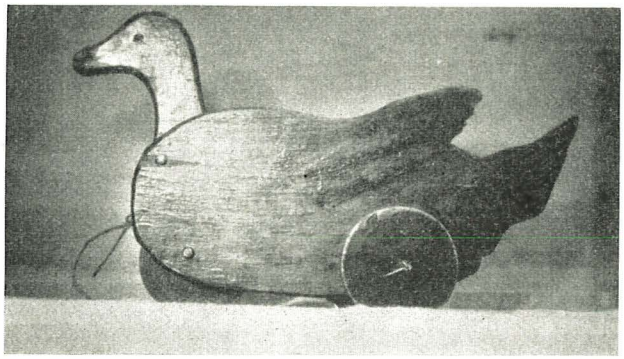
This paper must fit the flower pot and must be thin enough to fold readily. Fold on the dash lines first, thus dividing the whole into thirds. Fold again on the dotted lines. Cut on the folds according to the directions. The above are suggestions only.



Details of Mechanical Duck.



Details of Mechanical Duck.



Mechanical Duck Designed by Mr. Gerald F. Boate.

any 14-year-old boy in the manual training shop. However, the schedule of operations must be followed closely in order to insure success. The cost of the material is about twelve cents. Usually enough scrap stock of $\frac{3}{4}''$ clear white pine may be found about the shop to make the two sides, head, tail and the three wheels. A piece of No. 31 Stubb's gage, soft steel wire is suitable for the head and tail spindles, the front axle and the crank; the latter should have the ends flattened after it is put thru the sides then the rear wheels pressed on. By making these wheels rigid with the crank any motion given to the wheels will be transmitted to the crank and this in turn thru the flexible wires to the head and tail pieces. When the duck is drawn over the floor, by means of a piece of cord, the head will nod and the tail wag in a life-like fashion.

Schedule of Operations for Building and Assembling the Mechanical Duck.

(1) Lay out the head, tail, and side on tissue or butter paper, full size. The small squares in drawing No. 2 are one-half inch apart in full size. By following the intersections of these lines with the curves, the shape of these irregular curves may easily be drawn on the thin paper and transferred to the pieces of wood, by using carbon paper.

(2) Brad the two pieces of wood together which are to form the sides. Locate and drill the four 3/16″ holes for the spindles, crank and axle. The sides must be drilled in pairs in order that they line up when the duck is assembled. Band or turn-saw the sides to their shape.

(3) Drill the head and tail pieces with a 3/16″ bit, then saw them to shape on the band saw.

(4) Turn the three wheels, using $\frac{3}{4}''$ stock. Drill one in the center with a 3/16″ drill, the other two should have $\frac{1}{8}''$ holes drilled in their centers.

(5) Cut off three pieces of No. 33 (Stubb's gage) wire, 3″ long for the head, tail, and front wheel spindles. Bend a fourth piece to form the crank, giving it a $\frac{1}{2}''$ sweep, being careful that the outside shoulder distances be not greater than $1\frac{1}{8}''$.

(6) Cut out a thin strip of tin 9/16″ wide and $1\frac{1}{2}''$ long. Bend the strip of tin to fit snugly, yet loosely, around the crank, draw the ends together and drill a 1/16″ hole thru the two ends for the motion wire.

(7) Make eight wooden disks, called distance pieces, $\frac{1}{4}''$ thick and $\frac{5}{8}''$ in diameter, drill 3/16″ holes thru the center of each.

(8) Put small screw eyes in the head and tail pieces, as shown in drawing No. 2.

(9) Put the ends of the crank thru the sides and glue the blocks in place. The distance pieces may now be put on outside the sides, the ends of the crank flattened, and the rear wheels forced on.

(10) Put the head spindle thru the side, thread on a distance piece, then the head, then another distance piece, push the rod thru the other side and rivet the ends.

(11) Put the tail in place as described in operation No. 10.

(12) Connect the head, tail, and crank by fine picture wire made up in the shape of a "Y", as shown in Drawing No. 2.

(13) Put the front wheel in place as described in operation No. 10.

(14) Adjust the clip and "Y" wire so that the head and tail will be in a life-like position when the crank is in its lowest position.

(15) *Painting:* A coat of black paint is recommended on all parts before they are assembled. A final touching up after the duck is put together may be given by striping or mottling with colored oil paints, to represent a fancy drake.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for the convenience of subscribers who may have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from persons who are competent to answer. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any question and reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Finishing a Chest.

569. Q.—I would like to know how to finish properly a chest made of Tennessee red cedar and bound with white oak; that is, there is a strip of oak about $2\frac{1}{2}$ inches wide around the bottom and the top. Would like to bring out the beauty of the cedar and the quartered oak as much as possible.—*W. K. P.*

A.—After carefully considering the above question, I propose the following answer which I believe to be the most sensible solution:

When there is any doubt as to the most sensible and feasible way of finishing several woods in combination, one is always safe to obtain as natural a finish as possible; in fact, one might almost state this in the form of a precept: Nature never produces colors which are not in perfect harmony when considered in the natural state. For this reason I would prepare the cedar according to directions given on page 327 of the July, 1916, issue, and then prepare the oak in the following manner:

Scrape, sandpaper or otherwise smooth the wood to the best possible surface in order to have the color as light as possible. When this operation is complete, reduce a high grade white shellac one-half with alcohol and brush on a thin even coat. When this has dried one hour sandpaper very lightly with 00 sandpaper. Dust the work thoroly and then coat the entire chest with reduced white shellac and allow to dry two hours. Sand as for the oak, being careful not to rub the edges white. The purpose of the shellac in this reduced form is to prevent the oils in the varnish from being absorbed by the wood and thus becoming discolored in time. Dust the work again and carry the chest into some warm place free from dust where the varnishing can be done. It is best to separate the top and body of the chest, as the work can be done better under these conditions.

Brush on a thin coat of a very pale varnish. Let this dry in a warm atmosphere at least three days; sand down to a level surface with 00 sandpaper; dust thoroly and coat with a second coat of varnish. Let this dry one week; afterwards rub down with felt, FF pumice stone and water. Sponge off with clean water, dry with a chamois and brush a full-bodied third coat of varnish. Let this dry one week, rub as for coat No. 2 and either clean up in oil, or polish with oil and rotten stone until as brilliant as may be desired. It is preferable, however, for this class of work to leave it in a rubbed finish, as this is less easily scratched.

A good cleaning oil may be made for either rubbing or cleaning up work from one quart of gasoline to which should be added one cup of crude oil. This will be found satisfactory in practically all classes of cleaning up work and when

used with a dust cloth will keep the varnish in a bright, healthy condition.—*Ralph G. Waring.*

Finish for Basswood.

574. Q.—What is the best finish for basswood? Is there any finish which will bring the grain out very prominently?—*E. H. J. R.*

A.—There is practically no finish which will bring out the grain of basswood, as it is found in general on the lumber market, unless great care is taken to select wood from a tree which has grown on dry or rocky soil. This lack of abundant plant food produces a growth which is quite hard; much more so than the trees growing on swamp and bottom land. This last produces a soft wood, with very little difference between the spring and summer growth and a consequent inability to absorb stain material in variable amounts as is necessary in order to bring out the grain in wood. To my mind, however, this is not an objectionable feature, as it is often desirable to create a solid color effect, as in panelling in furniture.

I have found, thru long experiment, that a water stain is the only one practical for basswood; oils are not permanent and soon muddy the finish, while spirit stains penetrate too deeply and, because of the nature of the solvent, are very seldom permanent against fading.

At the present time a large amount of the medium grade of mahogany on the market is basswood in mahogany finish, with the brown mahogany predominating. A formula which I make up in quantity is as follows:

No. 1. Add to one gallon of water, 1 oz. tannic acid, 1 oz. pyrogallic acid. Sponge on this solution, let dry twelve or more hours, sand lightly with 00 sandpaper, and coat with:

No. 2. Dissolve in one gallon of water, 2 oz. potassium bichromate, 2 oz. potash, 2 oz. Bismark brown. Sponge on this solution, let dry over night, sand lightly with 00 sandpaper, being careful not to sand any edges white; then coat with a thin coat of white shellac reduced one-half with alcohol and slightly tinted with Bismark brown dissolved in alcohol.

After the shellac coat has dried two or three hours, sand very lightly with 00 paper, dust off carefully and carry to a room warm and free from dust. Give the work at least three coats of a good varnish, allowing three to seven days between coats. When dry sand each coat smooth and level with 00 or 000 sandpaper, sanding only in one direction, i. e., with the grain. Rub the last coat perfectly smooth and level with FF pumice stone, felt pad and water. Sponge off in water, dry with a chamois, and clean up in an oil polish.

With the brown finishes, simply leave out the Bismark brown; if dark browns are desired increase the amount of acids in No. 1. Finish as for brown mahogany.—*Ralph G. Waring.*

Books on Motors.

582. Q.—Can you tell me thru your question department, of a good book on the care of electric motors? Something that will explain the principles involved, and give instructions for keeping them in good running order?—*H. W. F.*

A.—Two of the best books on the care of electric motors are *The Electric Motor and Its Practical Operation,* by E. E. Burns, published by Joseph G. Branch Co., Chicago, and *The Care and Operation of Dynamos and Motors,* published by the Industrial Press, 49 Lafayette St., New York City.

Other good books are: *The Electric Transformation of Power,* by P. Atkinson, $2, D. Van Nostrand Co., New York; *Electro Motors,* by S. R. Bottone and A. M. A. Beale, D. Van Nostrand Co., New York; *Electric Motors,* by F. B. Crocker and M. Arendt, $2.50, D. Van Nostrand Co.; *The Management of Electrical Machinery,* by F. B. Crocker and S. S. Wheeler, $1, D. Van Nostrand Co.; *Dynamos and Electric Motors,* by P. N. Hasluck, N. W. Henley Publishing Co., New York.

Aviation Magazines.

585. Q.—Will you please give me the name or names of the very best aviation magazines, prices and addresses?—*C. O. G.*

A.—*Aero and Hydro.* Price, $3. Aero Publishing Co., 537 S. Dearborn St., Chicago; *Aeronautics.* (Semi-monthly) Price, $3. Aeronautics Press, Inc., 250 W. 54th St., New York; *Aircraft.* (Monthly) Price, $2. Lawson Publishing Co., 37 E. 28th St., New York; *Flying and Aero Club of America Bulletin.* (Monthly) Price, $3. Aero Club of America, 297 Madison Ave., New York.

Books on Wood Turning.

587. Q.—Can you suggest a good book suitable for beginning students of woodturning who wish to take up the construction of furniture making, having some advanced feature of turning in its construction?—*F. G. M.*

A.—*Problems in Wood Turning.* By F. D. Crawshaw. 80 cents. Manual Arts Press, Peoria, Ill.; *Elementary Turning.* By F. H. Selden. $1. Rand, McNally Co., New York City; *Labor Course in Wood Turning.* By M. J. Golden. *Wood Turning.* By G. A. Ross. $1. Ginn & Co., Boston, Mass.; *Wood Turning Exercises.* By Chas. H. Sampson. 75 cents. Milton Bradley Co., Springfield, Mass.; *Wood Turning.* Resides and Diemer. $1.50. Manual Arts Press, Peoria, Ill.; *Woodwork for Secondary Schools.* I. S. Griffith. $1.75. Manual Arts Press, Peoria, Ill.

Refinishing a Walnut Table.

577. Q.—Please tell me a simple method of refinishing a walnut table that is in good condition except for discolored spots and stains. The process given in the November, 1916, issue of the *Industrial-Arts Magazine* seems too elaborate for this instance.—*N. S. S.*

A.—In reply to the above question asking for a simple method of refinishing a walnut table, I suggest the following:

If the table is not too large, a quart of denatured alcohol will be sufficient to remove the varnish. To do this, make up a pad of old sheeting or similar material, saturate with the alcohol and with this rub off the old varnish down to the bare wood. When this process is complete, put the table in a warm place to dry for about ten hours. Sandpaper smooth with 00 sandpaper, dust and carry into a warm room free from dust. If a gloss finish is desired give several coats of Pratt & Lambert's No. 61 varnish, allowing one week and sandpapering between coats. If desired rub the last coat with felt pad, FF pumice stone and water. Sponge clean, dry with chamois and clean with a polishing oil.

A very fine, soft effect can be secured thru the use of Moller & Schumann's Hilo flat varnish, which is the only waterproof flat varnish on the market. This gives a splendid finish without the labor of rubbing with pumice stone. In applying the varnish it should be well brushed out since no flat varnish should be laid on as heavy in body as is customary with gloss varnish stock.—*Ralph G. Waring.*

Cork Board.

589. Q.—Will you please inform us where we can buy cork board?—*W. H. G.*

A.—American Linoleum Mfg. Co., 366 5th Ave., New York; Armstrong Cork Co., Pittsburgh, Pa.; Geo. W. Blabon Co., 21st and Hunting Park Ave., Philadelphia, Pa.; Cook's Linoleum Co., Trenton, N. J.; Farr & Bailey Co., Trenton, N. J.; Nairn Linoleum Co., Kearney, N. J.; Thomas Potter Sons & Co., Lafayette Bldg., Philadelphia, Pa.

Staining Red Cedar.

590. Q.—Can you inform me what stain is used to give red cedar a uniform color, bringing the white sapwood to the color of the heart wood? A finisher in a cedar box factory informed me that an acid was used, but either could not or would not say what the acid was.—*H. C. M.*

A.—See page 327, July, 1916, issue, question No. 387.

Books on Cupolas.

598. Q.—Kindly inform me where I can get information on the construction of very small cupolas and two or three manufacturers.—*W. R.*

A.—The following books give the information required: *International Library of Technology,* Cupola Practice, 3B, International Textbook Co., Scranton, Pa.; *West's Moulder's Textbook,* $2.50, John Wiley, New York; *Mullin's Modern Moulding and Pattern-making,* D. Van Nostrand Co., New York; *Parsons' Malleable Cast Iron,* $2.50, D. Van Nostrand Co., New York; *Payne's Iron Founders' Manual,* D. Van Nostrand Co., New York; *Horner's Practical Iron Founding,* $2, D. Van Nostrand Co., New York.